ARCADIS GERAGHTY&MILLER

RCRA Facility Invesitgation BTF and Sewers RFI Addendum

Sloss Industries, Inc.
Birmingham, Alabama

Prepared for:
Sloss Industries
3500 35th Avenue North
Birmingham, Alabama

Prepared by:
ARCADIS Geraghty & Miller Inc
14497 North Dale Mabry Highway
Suite 115
Tampa
Florida 33618
Tel 813 961 1921
Fax 813 961 2599

Our Ref.:
TF000320.0016

Date:
29 October 1999

ARCADIS GERAGHTY&MILLER

Figures

Tables

Appendices

GLOSSARY OF ABBREVIATIONS

ASI	Analytical Services Incorporated
ASTM	American Society for Testing Materials
BTF	Biological Treatment Facility
cm/sec	Centimeters per Second
DNAPL	Dense Non-aqueous Phase Liquid
DOT	Department of Transportation
FSP	Field Sampling Plan
Ft	Feet
ft amsl	Feet Above Mean Sea Level
ft bls	Feet below land surface
ft/day	Feet per day
ft/ft	Feet per Foot
ft/yr	Feet per Year
FWI	Facility-Wide Investigation
GETS	Ground Engineering and Testing Services, Inc.
HSWA	Hazardous and Solid Waste Amendment
I.D.	Inner Diameter
IDW	Investigation Derived Waste
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level
O-C	Organochlorine
O-P	Organophosphorous
OVM	Organic Vapor Monitor
PAH	Polycyclic Aromatic Hydrocarbon
PCBs	Polychlorinated Biphenyls
PID	Photo Ionization Detector
PP	Priority Pollutant
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
RBC	Risk-Based Concentration
RCRA	Resource Conservation Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
Sloss	Sloss Industries Corporation
SVOC	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
ug/L	Micrograms per Liter
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1. INTRODUCTION

Sloss Industry Corporation (Sloss) located in Jefferson County, Alabama, is evaluating past waste management practices in accordance with the regulations set forth by the Hazardous and Solid Waste Amendments (HSWA) of the Resource Conservation Recovery Act (RCRA) (Figure 1-1). In August 1990, ARCADIS Geraghty & Miller, Inc. was contracted by Sloss to prepare and implement a RCRA Facility Investigation (RFI) Work Plan for 39 solid waste management units (SWMUs) identified at the Sloss Facility during the RCRA Facility Assessment (RFA) (Figure 1-2). A RFI Work Plan was prepared and approved by the United States Environmental Protection Agency (USEPA) in May 1995. The Work Plan describes the investigations that will be conducted to characterize the nature, extent, and rate of contaminant migration from the SWMUs identified at the Facility.

In the RFI Work Plan, the SWMUs were separated into four separate areas: Coke Manufacturing Plant, Land Disposal Areas, Biological Treatment Facility (BTF) and Sewers, and Chemical Manufacturing Plant (Table 1-1 and Figure 1-2). These areas were created to group similar industrial activities together and allow for a systematic implementation of the investigation activities at each area. Initially, a Facility-Wide investigation (FWI) was completed in June through August 1995 to develop a conceptual hydrogeologic and hydrologic model of the Sloss Facility. The conceptual model details information on groundwater and surface water flow for use in assessing possible contaminant transport for future SWMU investigations. The RFI Facility-Wide Report was submitted to the USEPA in February 1996.

After completion of the RFI Facility-Wide Report, Sloss began focusing on the areas within the Facility as specified in the RFI Work Plan. Each of the four areas (Coke Manufacturing Plant, Land Disposal Areas, BTF and Sewers, and Chemical Manufacturing Plant) are being sequentially investigated and evaluated. The Coke Manufacturing Plant investigation was conducted in June 1996 and the RFI report for this area was submitted to the USEPA in February 1997. The Land Disposal Areas investigation was conducted from June to August 1997 and the RFI report for this area was submitted to the USEPA in January 1998.

The BTF and Sewers investigation was conducted from June to August 1998 and the RFI report for this area was submitted to the USEPA in February 1999. The BTF and Sewers RFI recommendations proposed additional groundwater investigations for the BTF Equalization Basin and BTF Emergency Basin (SWMUs 13 and 21) to further delineate the extent of dense non-aqueous phase liquid (DNAPL) in the vicinity of monitor well MW-4A, MW-3, and the first MW-10 borehole and to further delineate the extent of light non-aqueous phase liquid (LNAPL) in the vicinity of MW-6. The recommendations also proposed conducting a remedial measures evaluation for removal of the DNAPL and LNAPL at SWMUs 13 and 21.

The BTF and Sewers RFI Report also proposed additional groundwater investigations for BTF SWMUs 14 through 19. A monitor well was proposed at the soil boring 13-SB0010 location to assess if benzo(a)pyrene and other polycyclic aromatic hydrocarbons (PAHs) detected in soil samples collected immediately above the bedrock were leaching into site groundwater. This monitor well was also proposed to delineate the extent of benzene in groundwater at SWMUs 13 and 21.

Because of the presence of DNAPL and LNAPL in the SWMU 13 and 21 groundwater, Sloss Industries took a proactive approach and conducted these proposed field investigations in June 1999. The recommendations for the other BTF and Sewers SWMUs (SWMUs 4, 37, and 22) will be implemented after USEPA approval of the BTF and Sewers RFI Report. This BTF and Sewers RFI Addendum Report summarizes the results of the BTF and Sewers RCRA Facility Addendum Investigation

The RFI for the Chemical Manufacturing Plant was also implemented in 1999 and the results will be summarized in a separate report.

1.1 SITE BACKGROUND

Site background is discussed in Section 1.1 of the BTF and Sewers RFI Report.

1.2 OBJECTIVES

The objectives of the BTF and Sewers RFI are to: (1) confirm the presence or absence of contamination at the site; (2) determine the extent and degree of contamination at the site; (3) identify and characterize the sources of contamination for the site; (4) assess the potential for contaminant migration to surrounding environments; (5) identify public health and environmental risks of any contaminants; and (6) define the scope of future investigations and/or actions at the site.

The specific objectives of the BTF and Sewers RFI Addendum were to delineate the extent of DNAPL, LNAPL, and benzene in the groundwater at SWMUs 13 and 21 and confirm the presence or absence of benzo(a)pyrene and other PAHs in groundwater at BTF SWMUs 14 through 20. The sources of the LNAPL, DNAPL, and benzene contamination were also identified and characterized.

1.3 SCOPE

The scope of work conducted in June 1999 at the BTF Equalization Basin and BTF Emergency Basin (SWMUs 13 and 21) and BTF SWMUs 14 through 20 is presented below.

BTF Equalization Basin and BTF Emergency Basin (SWMUs 13 and 21): The RFI Addendum investigation for SWMUs 13 and 21 consisted of the following tasks:

1. Installation of six monitor wells: Three monitor wells were installed in the vicinity of MW-4A, MW-3 and MW-10 and three monitor wells were installed in the vicinity of MW-6 to assess the extent of the DNAPL and LNAPL contamination. The monitor wells were also installed to collect lithologic data, water level data, evaluate the hydraulic conductivity of the aquifer, and assess groundwater quality.

2. Hydraulic conductivity testing of the aquifer: Aquifer tests were conducted on each monitor well to determine hydraulic conductivities and groundwater flow velocities.

3. Groundwater sampling: Groundwater sampling was conducted to confirm the presence or absence of groundwater contamination in the vicinity of the DNAPL and LNAPL. Additionally, data from the monitor well installed at BTF SWMUs 14 through 20 was used to delineate the extent of benzene in groundwater.

4. Bail down tests: Bail down tests were conducted at MW-4A and MW-6 to determine the recovery rate of the DNAPL and LNAPL present in these wells for the remedial measures evaluation.

BTF pH Neutralization Basin (SWMU 14), BTF Primary Clarifier (SWMU 15), BTF Aeration Basin (SWMU 16), BTF Secondary Clarifier (SWMU 17), BTF Thickener (SWMU 18), BTF Digester (SWMU 19), Dewatering Machine (SWMU 20): The RFI Addendum investigation for SWMUs 14 through 20 consisted of the following tasks:

1. Installation of one monitor well: The monitor well was installed to collect lithologic data, water level data, evaluate the hydraulic conductivity of the aquifer, and assess groundwater quality.

2. Hydraulic conductivity testing of the aquifer: An aquifer test was conducted on the new monitor well to determine the hydraulic conductivity and groundwater flow velocity.

3. Groundwater sampling: Groundwater sampling was conducted to assess the presence or absence of benzo(a)pyrene and other PAHs in the BTF area groundwater.

2. STUDY AREA

Summaries of site topography, surface water, geology (regional and Facility), soils (Facility and background), and hydrogeology (regional and Facility), are presented in Sections 2.1, 2.2, 2.3, 2.4, and 2.5, respectively, of the BTF and Sewers RFI Report (February 1999). Descriptions of the history, current conditions, and previous investigations for SWMUs 13 and 21 and SWMUs 14 through 20 are summarized in Sections 2.6.1 and 2.6.2, respectively, of the BTF and Sewers RFI Report (February 1999).

3. DESCRIPTION OF INVESTIGATIVE TASKS

3.1 Monitor Well Installation

3.1.1 Installation Methods

Six monitor wells (MW-38 through MW-43) were installed at SWMUs 13 and 21 and one monitor well (MW-44) was installed at SWMUs 14 through 19 during the BTF and Sewers RFI Addendum. The monitor well locations are shown on Figure 3-1. Monitor wells MW-38 through MW-43, which were screened across the overburden/rock interface, were installed to delineate the extent of DNAPL and LNAPL and characterize site groundwater. Monitor well MW-44 was installed in the bedrock in the first water bearing zone encountered during drilling to assess the presence or absence of benzo(a)pyrene and other PAHs in site groundwater and to delineate the extent of benzene at SWMUs 13 and 21. Information from these monitor wells also assisted field personnel with characterizing the site geology, hydraulic gradients, groundwater flow rates, and flow direction in the BTF area. Construction details for the new monitor wells are included in Table 3-1. The monitor wells were installed using the following procedures.

A decontamination pad for decontamination of drilling equipment was constructed using plastic sheeting on a bermed, concrete pad near the Chemical Manufacturing Plant. All drilling and sampling equipment was decontaminated in accordance with the Quality Assurance Project Plan (QAPP).

3.1.1.1 Borehole Installation

Two drill rigs and two different methods of drilling were utilized to drill the boreholes for monitor wells MW-38, MW-39, MW-40, MW-43, and MW-44. First, a hollow stem auger drill rig was used for drilling in the unconsolidated residuum and collecting split spoon samples. After the auger rig encountered bedrock or auger refusal, down-hole air rotary and/or percussion hammer drilling was used to complete the monitor well borehole in bedrock.

The hollow stem auger drill rig, using 3.25 inner diameter (I.D.) augers, was used to drill a nominal 7.25 inch pilot hole through the overburden sediments to auger refusal. At monitoring well locations MW-38, MW-39, MW-40, and MW-43, 2-foot split spoon formation samples were collected continuously from the land surface to the top of bedrock. Because MW-44 was installed adjacent to soil boring 13-SB0010 where continuous lithologic data was previously collected, split spoon samples were only collected from 14 feet below land surface (ft bls) to bedrock. The split spoon sampling was performed in accordance with American Society for Testing Materials (ASTM) Method D-1586. After the split spoon was opened, the samples were field screened to determine the concentration of volatile organic vapors, using an organic vapor monitor (OVM) equipped with a photo ionization detector (PID). The physical characteristics of the samples obtained were described in detailed soil boring logs using the Unified Soil Classification System (USCS). Copies of the soil boring logs for the newly installed monitor wells are provided in Appendix A.1.

At monitor well locations MW-41 and MW-42, the auger rig was not used to drill through the overburden because a gas pipeline drip leg is located in this area. An attempt was made to use a hand auger and post hole digger to drill through the overburden, however, there was auger refusal at approximately 2 ft bls because of the presence of gravel (ballast) in the fill in this area. Since there was hand auger refusal at 2 ft bls, down-hole air rotary drilling was used to install nominal 6.25-inch diameter boreholes in the unconsolidated material. Percussion hammer drilling was then used to complete the monitor well boreholes in bedrock

Air was used as the circulating media during the air rotary and percussion hammer drilling to clear the borehole of cuttings. The air from the compressor on the rig was filtered using in-line and external filters to prevent oil from the compressor from being introduced into the borehole. A small volume of potable water was occasionally used during drilling to assist in the removal of drill cuttings. Cuttings from the air rotary and percussion hammer drilling were examined to determine the physical characteristics of the overburden and bedrock.

Prior to drilling in the bedrock, the existing 7.25-inch auger rig boreholes for monitor wells MW-39, MW-40, and MW-43 were cleaned out with a 6-inch rotary bit. A nominal 6-inch diameter borehole was then drilled into the rock by down-hole percussion hammer drilling. The MW-39, MW-40, and MW-43 boreholes were advanced 9.75, 9.55, and 10.75 feet (ft), respectively, into the bedrock so the screen would intersect the overburden/rock interface. Since groundwater had collected in the auger rig boreholes, it was difficult to keep the boreholes open during installation of MW-39 and MW-40. To avoid the problems encountered during installation of MW-39 and MW-40, the auger borehole for MW-38 was abandoned and a second borehole was drilled from land surface into bedrock using the air rotary and percussion hammer methods of drilling. The MW-38 borehole was advanced 9 ft into the bedrock so the screen would intersect the overburden/rock interface. The first MW-38 borehole was abandoned by filling the borehole with a 3% bentonite mixture of neat cement grout.

An attempt was made to install MW-44 without a surface casing, however the borehole would not remain open. Since the MW-44 borehole was already drilled 8.75 ft into the bedrock, a surface casing could not be sealed at the top of bedrock. The initial borehole was abandoned by filling the borehole with a 3% bentonite mixture of neat cement ground and a second 10-inch diameter borehole was drilled using the air rotary method of drilling. The second borehole for MW-44 was advanced approximately 2.5 ft into the bedrock surface. After removal of the drill bit, a 6-inch steel surface casing was installed to the total depth of the borehole. The annular space was then sealed with neat cement grout by grouting with a tremie pipe from the bottom of the borehole to land surface. The cement grout consisted of a mixture of Portland Type I cement (ASTM Method C-150) and water in a proportion that did not exceed seven gallons of potable water per bag of cement (94 pounds). Additionally, 3 percent by weight of bentonite was added to the grout to minimize shrinking and to control the heat of hydration during grouting.

After allowing the surface casing grout to set at MW-44, a nominal 6-inch diameter borehole was drilled inside the surface casing by down-hole percussion hammer drilling. The borehole for MW-44 was advanced in bedrock until the drill cuttings were wet and the borehole appeared to produce sufficient water for a monitor well. The screened interval for monitor well MW-44 was selected so that the completed monitor well would provide representative hydrologic information for the first water bearing zone

A temporary 6-inch steel surface casing was installed in MW-41 to hold the borehole open because loose fill material was present in this area. After the nominal 6.25-inch borehole was advanced through the overburden using the air rotary method of drilling, a 6-inch steel surface casing was installed to the top of bedrock. The annular space at the land surface was sealed off with visquene to prevent rock cuttings from falling into the annular space during drilling. The remaining annular space was left open. A nominal 6-inch diameter borehole was drilled inside the temporary surface casing by down-hole percussion hammer drilling 7.75 ft into the bedrock so the screen would cross the overburden/rock interface. Prior to completing MW-41, the temporary surface casing was removed. After the nominal 6.25-inch diameter overburden borehole for MW-42 was completed, a nominal 6-inch diameter borehole was drilled 9.5 ft into the bedrock by down-hole percussion hammer drilling so the screen would intersect the overburden/bedrock interface.

3.1.1.2 Monitor Well Construction

Monitor wells MW-38 through MW-44 were constructed using 10 ft of new, 2-inch-diameter, factory slotted, 0.010-inch slot polyvinyl chloride (PVC) screen with schedule 40, threaded, flush joint, PVC casing extending to land surface. MW-38 through MW-43 were screened across the overburden/rock interface and between 0.75 and 2.75 ft of the screen was installed in the overburden. The MW-44 screen was installed in the bedrock. A schematic diagram of a typical bedrock monitor well and DNAPL and LNAPL delineation monitor well are shown in Figures 3-2 and 3-3, respectively. The PVC casings conformed to the requirements of ASTM Method D-1785 and carried the seal of the National Sanitation Foundation. A section of closed end, schedule 40 PVC casing was attached to the bottom of each screen to provide a sump for sediments. Each monitor well was fitted with a watertight cap.

The annular space between the borehole and the screen was filled with 20/30 graded silica sand from the bottom of the borehole to 2 to 8 ft above the top of the well screen, either by gravity feeding the sand from the surface, or by using the tremie method.

A nominal 1 to 3-foot thick bentonite seal was placed above the filter pack in each monitor well to prevent the downward migration of cement grout. The seal, consisting of tamped bentonite pellets, was installed by gravity feeding from the surface and allowed to hydrate for a minimum of one hour. The remaining annular space above the bentonite was sealed by pressure grouting with neat cement grout through a tremie pipe to land surface. The cement grout consisted of a mixture of Portland Type I cement (ASTM Method C-150) and water in a proportion that did not exceed seven gallons of clean water per bag of cement (94 pound). Additionally, 3 percent by weight of bentonite powder was added to the grout to minimize shrinking and control the heat of hydration during grouting.

Precautions were used during the drilling and monitor well construction to prevent the entry of foreign material into the well. Monitor well casings for MW-40 through MW-44 were set to extend to two to three feet above grade, and surrounded by a 4-inch diameter protective steel casing set into a concrete pad. The protective steel casings have locking caps. Monitor wells MW-38 and MW-39 were flush mounted and surrounded by a vault with a manhole cover set into a concrete pad because they are located in the middle of a parking lot. Each concrete pad has nominal dimensions of 3 ft x 3 ft x 4-inches and slopes away from the monitor well. A permanent metal plate was installed in each concrete pad and stamped with the monitor well identification number. In areas where monitor wells could possibly be damaged by vehicular traffic, 4-inch diameter steel protective posts were placed equally spaced around the monitor well. Four bumper posts were installed at monitor wells MW-40 through MW-44. When installed, the protective posts were concreted into the ground to a depth of approximately two-ft bls, and then the posts were filled with concrete.

The ARCADIS Geraghty & Miller representative prepared detailed monitor well construction and sample core logs for each monitor well. Copies of the field logs for the monitor wells installed during the BTF and Sewers RFI Addendum are included in Appendix A.2.

3.1.1.3 *Investigation Derived Waste*

Drill cuttings from each borehole were containerized in Department of Transportation (DOT) approved 55-gallon drums and labeled with the well number, date, and site. In June 1999, investigation derived waste (IDW) rock cuttings from monitor wells installed during the BTF and Sewers RFI Addendum were sampled and analyzed for volatile organic compounds (VOCs) (USEPA Method 8260B), semivolatile organic compounds (SVOCs) (USEPA Method 8270C), the thirteen Priority Pollutant (PP) metals, barium, cyanide, and percent moisture. Analytical reports for the IDW samples, checklists completed during the data validation, characterization of the IDW, and recommendations for disposal will be submitted in a separate report that will be prepared for the IDW containerized during the 1999 RFI. The IDW report will be submitted with the Chemical Manufacturing Plant RFI Report.

3.1.2 Well Development

After completion of each monitor well, but no sooner than 24 hours after grouting was completed, monitor well development was conducted. The monitor wells were developed by pumping and/or bailing. No acids or dispersing agents were used in any monitor well. Development continued until the pH, conductivity, and turbidity of the groundwater had stabilized, or until it was determined that further development would not provide any significant improvement in turbidity. Monitor well development logs are presented in Appendix A.3.

Development water was containerized in DOT-approved 55-gallon drums and labeled with the monitor well identification number, site location and date. The groundwater sampling results will be used to characterize the IDW development water. Characterization of the IDW development water and disposal recommendations will be submitted in a separate report that will be prepared for the IDW containerized during the 1999 RFI. The IDW report will be submitted with the Chemical Manufacturing Plant RFI Report.

3.2 IN-SITU PERMEABILITY TESTING

In-situ permeability tests were performed on each of the newly installed monitor wells to determine the hydraulic conductivity of the formation around the screened portion of each well. The tests were performed by rapidly lowering a sealed, closed end, sand filled PVC pipe (slug) into each monitor well, instantaneously displacing the water column from its initial static level. The water level in each monitor well was measured to 0.01-foot accuracy with a pressure transducer and an In-Situ Model SE 1000B Hermit data logger. The initial phase of the test is known as a falling head slug test. After the water level had equilibrated, less than 0.01 ft change over at least six minutes, the slug was quickly removed causing the water column to instantly fall and then begin to rise towards its static level. The falling head and rising head versus time data were analyzed to determine the hydraulic conductivity at each monitor well tests. The accumulated data were electronically downloaded to a personal computer for analysis of the raw data.

The hydraulic conductivity was calculated using AQTESOLV™ software that solves for hydraulic conductivity using the method presented by Bouwer and Rice (1976). In general, data from the water-level displacement during the initial phase of infiltration and recovery were given a higher weight due to minimal sandpack effects, and the best-fit line was found for data points from the beginning of the test which represent steady-state recovery. Monitor well slug test logs and evaluations are presented in Appendix C for the newly installed monitor wells. Table 3-2 summarizes the slug test results.

3.3 Water Level Measurements

Water level measurements were collected on June 16, 1999 at all monitor wells installed in the BTF area using an electronic water rule (Appendix A.4). Table 3-1 summarizes water level data collected on June 16, 1999. Additionally, the surface water level in the drainage ditch was measured at staff gage SG-1A. The electronic water rule was decontaminated prior to use at each monitor well according to the procedures specified in the site QAPP.

3.4 Groundwater Sampling

A total of seven (7) monitor wells (MW-38 through MW-44) were sampled during the BTF and Sewer RFI Addendum. The purpose of the groundwater sampling and analysis was to determine if groundwater had been impacted by the DNAPL and LNAPL present in the SWMU 13 and 21 area and by benzo(a)pyrene and other PAHs detected in the soil at BTF SWMUs 14 through 20. Copies of the groundwater sampling logs are included in Appendix A.5. A sample designation explanation is provided in Appendix B.

Groundwater sampling was conducted in accordance with the procedures specified in the Field Sampling Plan (FSP) and QAPP, which are summarized below. After taking water level and total depth measurements using an electronic water rule at each well, the volume of water in the wells and the purge volume were calculated. The well was purged using a 2-inch submersible pump with the pump intake approximately 10 ft into the water column. As drawdown increased, the pump was lowered to prevent exposure of the intake. In this manner, stagnant water was removed from the well casing from the top to the bottom. If no appreciable drawdown was observed, the pump was not lowered and fresh formation water was allowed to be drawn up the casing to the intake point by the pump.

not Low Flow

The 2-inch submersible pump is equipped with a check valve which prevents purged water in the discharge hose from draining out of the pump during removal of the pump from the well or while the pump is shut off. Pumping rates of one gallon per minute or less were used to purge wells to minimize the amount of sediment entrained in the water column.

Three to five well volumes were purged from each monitor well using the 2-inch submersible pump unless the well went dry. Monitor well MW-40 pumped dry after approximately two well volumes and was sampled within 24 hours, after the water levels had recovered enough to collect the required samples. Less than five well volumes were purged only when pH, conductivity, temperature, dissolved oxygen, and turbidity readings stabilized in less than five well volumes.

wells purged to dry

Field parameters (pH, conductivity, temperature, dissolved oxygen, and turbidity) were measured during purging and immediately before collecting groundwater samples from each monitor well sampled (Table 3-3). Field instruments were calibrated according to the frequency and procedures specified in the site QAPP.

After 5 well volumes had been purged or field parameters stabilized, groundwater samples were collected through a Teflon™ bailer for VOCs (USEPA Method 8260B), SVOCs (USEPA Method 8270C), the thirteen PP metals, barium, and cyanide. The Teflon™ bailer was attached to a Teflon™ coated stainless steel cable. The VOC samples were collected using the procedures detailed in the site QAPP to minimize aeration of the sample.

Groundwater samples for VOCs (USEPA Method 8260B) were collected first using the procedures detailed in the site QAPP to minimize aeration of the sample. Then samples for SVOCs (USEPA Method 8270B), the thirteen PP metals, barium, and cyanide were collected.

After collection, sample containers were placed in a cooler containing ice. Duplicate samples were collected by filling containers with equal aliquots of groundwater. Equipment blank, field blank, and duplicate samples were collected according to the frequency and procedures specified in the site QAPP. All sampling equipment was decontaminated in accordance with the QAPP.

The groundwater samples were preserved with ice and relinquished to a courier for delivery to Analytical Services, Incorporated (ASI). Analytical reports for the groundwater samples are presented in Appendix B. After completion of the sampling and analysis program, the field and analytical data were reviewed and validated according to procedures outlined in the site QAPP. The checklists completed during the data validation are included in Appendix B.

Purge water was containerized in DOT-approved 55-gallon drums and labeled with the monitor well identification number, site location, and date. If development water drums at each monitor well location were not completely filled, purge water generated during the groundwater-sampling event was placed in the development water drums. Purge water from monitor wells MW-41, MW-42, and MW-43 was not mixed. Purge water from monitor wells MW-38, MW-39, and MW-40 were containerized in the same drum. Groundwater sampling results will be used to characterize the IDW purge water. Characterization of the IDW purge water and disposal recommendations will be submitted in a separate report that will be prepared for the IDW containerized during the 1999 RFI. The IDW report will be submitted with the Chemical Manufacturing Plant RFI Report.

3.5 Bail Down Tests and Product Monitoring

From June 14, 1999 to June 22, 1999, bail down tests were performed on MW-4A and MW-6 to determine the recovery rate of the DNAPL and LNAPL, respectively in these wells. Prior to bailing the product, depth to water, depth to product, and total well depth measurements were taken using an oil-water interface probe. The DNAPL was removed from MW-4A using a Teflon™ bailer until the well purged dry. The LNAPL was removed from MW-6 using a peristaltic pump until the purge water was product free. Purge water was containerized in DOT-approved 55-gallon drums and labeled with the monitor well identification number, site location, and date. The depth to water and depth to product in both wells were monitored every 2 to 3 days to determine the rate of product recovery.

Additional bail down test monitoring data was collected on August 26, 1999 and September 23, 1999. Depth to water and depth to product were measured in MW-4A and MW-6. In the vicinity of MW-6, depth to water and total depth were measured in MW-01, MW-41, MW-43, and MW-42 to determine if LNAPL was present in these wells. North of the equalization basin, depth to water and total depth were measured in MW-3, MW-10, and MW-40 to determine if DNAPL was present in these wells.

Copies of the bail down test logs and monitoring data are presented in Appendix A.6. The oil-water interface probe was decontaminated prior to use at each monitor well according to the procedures specified in the site QAPP.

3.6 SITE SURVEY

Abrams Aerial Survey Corporation prepared a site topographic map for the Sloss Industries Corporation Facility during preparation of the RFI Work Plan. During the FWI, information was obtained from Abrams Aerial Survey Corporation on the survey control used during preparation of the base map so that the site survey for each of the RFIs could be tied to the existing site map. This site map was used as the base map for the BTF and Sewers RFI Addendum. All surveying completed for the BTF and Sewers RFI Addendum was conducted by a State-certified land surveyor.

In June 1999, newly installed monitor well locations were surveyed vertically to mean sea level and tied horizontally to the site base map. BTF and Sewers RFI Addendum survey data is presented in Appendix D.

4. DESCRIPTION OF INVESTIGATION RESULTS

The BTF and Sewers RCRA RFI Addendum focuses on SWMUs 13 and 21 and BTF SWMUs 14 through 20. In the SWMU 13 and 21 area, three monitor wells were installed on the north side of the equalization basin to delineate the extent of DNAPL in groundwater in the vicinity of MW-4A, MW-3, and the first MW-10 borehole. Additionally, three monitor wells were installed on the south side of the equalization basin to delineate the extent of LNAPL in groundwater in the vicinity of MW-6. Data collected from new and existing monitor wells were used to delineate the extent of DNAPL and LNAPL in site groundwater. Bail down tests were performed on MW-4A and MW-6 to determine the recovery rate of the DNAPL and LNAPL.

The chemical properties of groundwater were also investigated to assess the impacts of the DNAPL and LNAPL on site groundwater. Groundwater samples were collected from the new monitor wells in June 1999 and analyzed for the standard site analyte list, which includes VOCs (USEPA Method 8260B), SVOCs (USEPA Method 8270C), the thirteen PP metals, barium, and cyanide. Groundwater quality data collected from the newly installed monitor wells installed in 1999 and monitor wells sampled in 1998 during the BTF and Sewers RFI were used to evaluate the SWMU 13 and 21 groundwater.

In the SWMU 14 through 20 area, the chemical properties of the groundwater were investigated to determine if soil containing benzo(a)pyrene and other PAHs was impacting site groundwater. Groundwater samples were collected from MW-44 in 1999 and analyzed for the standard site analyte list. Groundwater quality data collected from MW-44 in 1999 and the SWMU 13 and 21 monitor wells in 1998 and 1999 were used to evaluate the groundwater at SWMUs 14 through 20.

Groundwater concentrations were evaluated based upon a comparison to USEPA Maximum Contaminant Levels (MCLs) or Region III Risk Based Concentrations (RBCs) for tap water if an MCL was not available for a constituent.

4.1 BTF Equalization Basin and BTF Emergency Basin (SWMUs 13 and 21)

4.1.1 Site Specific Geology

SWMUs 13 and 21 are located east of the Opossum Valley Fault mapped during the FWI and are underlain by the Conasauga Formation. Measured dips range from 26° to 32° to the southeast. The geology and structural features of the BTF area are depicted on Figures 4-1 and 4-2. The cross section location is presented on Figure 4-3.

Monitor wells MW-1 through MW-12 and monitor wells MW-38 through MW-44 were screened in a micritic limestone interpreted to be within water-bearing portions of the Conasauga Formation, just east of the Opossum Valley fault. Monitor wells MW-38 through MW-43 are also partially screened within the overburden since the wells are screened across the overburden/rock interface. In the BTF area, fracturing was observed in the vicinity of monitor wells MW-4A, MW-5S, MW-7, MW-8, MW-9, MW-11, MW-12, MW-40, MW-41, MW-42, and MW-43 (Table 3-2). Monitor wells MW-10, MW-5D, MW-38, and MW-39 appear to be screened within a relatively less permeable portion of the upper Conasauga Formation (alternating hard and shaley or soft limestone was observed in these borings) and may indicate that little weathering and or fracturing of the bedrock is present. Monitor well MW-10 and MW-5D pumped dry during development and groundwater sampling.

The overburden consists primarily of clay fill material on the north, south (on the north side of the drainage ditch), and west sides of SWMUs 13 and 21 area. Prior to construction of the BTF, this area was excavated and then backfilled as the BTF was constructed. East of SWMU 13 and the drainage ditch, the overburden consisted of 5 to 9 ft of fill material overlying clay. In the area south of SWMUs 13 and 21 and the drainage ditch near the gas pipeline drip leg, the overburden consists of fill from land surface to bedrock. This area was most likely excavated while installing the gas pipeline drip leg and then covered with fill material. Immediately south of the drainage ditch, the overburden consists of approximately four feet of clay fill material overlying dark gray clay with gravel.

Thickness of the overburden ranges from 6 to 24 ft. The soil overburden is thickest west of SWMU 21 at the locations of monitor wells MW-7 and MW-8 and thinnest at east of the drainage ditch and south of the drainage ditch near the gas pipeline drip leg. Bedrock topography for SWMUs 13 and 21 and the BTF area is presented in Figure 4-4. A slight bedrock low occurs beneath SWMU 21 and the western half of SWMU 13. The bedrock low extends to the north and is present beneath BTF SWMUs 14, 15, and 17 through 20 and the western portion of SWMU 16.

4.1.2 Site Specific Hydrogeology

Lithologic samples, water-level measurements, and the results of the in-situ permeability testing were used to develop an understanding of the hydrogeology at SWMUs 13 through 21.

In the vicinity of SWMUs 13 and 21, the observed groundwater elevations range from 521.58 (MW-5D) to 530.37 (MW-2) feet above mean sea level (ft amsl) (Table 3-1 and Figure 4-5). The direction of groundwater flow is to the southeast toward the drainage ditch. A slight groundwater mound occurs south of the control building, where a slight bedrock low occurs, and may be the source of the spring that has been reported in this area.

In the SWMU 13 and 21 area, the hydraulic conductivities calculated from slug tests conducted on monitor wells installed in the Conasauga limestone are variable. Table 3-2 summarizes the well depth, lithology screened, and calculated hydraulic conductivity values for monitor wells installed in the SWMU 13 and 21 area. The hydraulic conductivity variability appears to be related to the amount of fracturing present in the limestone, as well as, the amount of water present in the hard, soft and shaley areas of the limestone. Hydraulic conductivities calculated for monitor wells installed in portions of the Conasauga limestone where fractures were present range from 6.9×10^{-5} centimeters per second (cm/sec) (MW-11) to 8.9×10^{-3} cm/sec (MW-5S). Hydraulic conductivities calculated for monitor wells installed in portions of the

Conasauga limestone where fractures were not present range from 3.9 X 10^{-8} cm/sec (MW-5D) to 1.1 X 10^{-4} cm/sec (MW-1 and MW-10).

The average horizontal hydraulic gradient in the vicinity of SWMUs 13 and 21 is 0.013 feet per foot (ft/ft). This average hydraulic gradient was used to calculate groundwater flow velocities, using an assumed porosity of 0.20 or 0.01 for formation materials (Table 3-2). Similar to the hydraulic conductivities, the groundwater flow velocities calculated for the Conasauga limestone are also variable. Calculated groundwater flow velocities for monitor wells installed in fractured portions of the Conasauga limestone range from 10 feet per year (ft/yr) (MW-9 and MW-12) to 200 ft/yr (MW-7 and MW-8) with the exception of MW-5S where a groundwater flow velocity of 1000 ft/yr was calculated (Table 3-2). Calculated groundwater flow velocities for non-fractured portions of the limestone range from 0.1 ft/yr (MW-5D) to 150 ft /yr (MW-10).

4.1.3 DNAPL and LNAPL Delineation at SWMU 13

During the BTF and Sewers RFI investigation conducted in June 1998, DNAPL and LNAPL were present in groundwater north and south of the equalization basin. Additional investigations were conducted during the BTF and Sewers RFI Addendum to delineate the extent of the DNAPL and LNAPL.

4.1.3.1 North of the Equalization Basin

East and north of the equalization basin, a DNAPL was present in groundwater at MW-4A, MW-3, and in the first MW-10 borehole during the 1998 BTF and Sewers RFI. A LNAPL was also present in MW-4A. To further delineate the extent of the DNAPL in the bedrock, three monitor wells, MW-38, MW-39, and MW-40, were installed during the BTF and Sewers RFI Addendum. Monitor wells MW-38 and MW-39 were installed 40 ft west and 48 ft north of MW-3, respectively, and MW-39 was installed 60 ft south of MW-10 and between MW-4A and MW-3 as shown on Figure 4-6.

DNAPL was not present in the soil and rock cuttings examined during installation of new monitor wells MW-38, MW-39, and MW-40 in 1999 and MW-10 installed in 1998. Additionally, DNAPL and LNAPL have not been detected in these monitor wells. On June 14, 1999, prior to beginning the bail down test, approximately 5.43 ft of product was measured at the bottom of MW-4A (Table 4-1). Although DNAPL was not observed in MW-3 on September 23, 1999, DNAPL was found in this well when it was being redeveloped in 1998.. The approximate extent of DNAPL in the SWMU 13 and 21 area groundwater is presented on Figure 4-6.

DNAPL

As shown on Figure 4-6, it appears that there are isolated pockets of DNAPL in the bedrock north of the equalization basin. As discussed in the BTF and Sewers RFI, the DNAPL in the groundwater is most likely the result of pre-RCRA waste management practices. Prior to construction of the BTF in 1975, sediment and material from Sloss Facility wastewater was deposited in the BTF area. In historical aerial photographs, the pre-RCRA sewer system was visible as a stream that flowed northeast across the BTF area and discharged into the Polishing Pond (Figure 4-7).

4.1.3.2 South of the Equalization Basin

In the area south of the BTF Equalization Basin and the drainage ditch, a LNAPL was present in MW-6 during the 1998 BTF and Sewers RFI. A LNAPL was first detected in this well in March 1987. To further evaluate the extent of the LNAPL in groundwater in the MW-6 area and evaluate the source of the LNAPL, three monitor wells, MW-41, MW-42, and MW-43, were installed during the BTF and Sewers RFI Addendum. Monitor well MW-41 was installed 25 ft southwest of MW-6 adjacent to the gas pipeline drip leg, MW-42 was installed 54 ft east of MW-6, and MW-43 was installed 26 ft north of MW-6 as shown on Figure 4-6.

Soil and rock lithologic data collected during the BTF and Sewers Addendum investigation and historical soil data were used to assess the extent of impacted soil and bedrock in the vicinity of MW-6. MW-41 soil cuttings consisted of dark brown to black fill composed of gravel (ballast), sand and clay. A slight odor was observed from 1 to 5 ft bls and between 5 and 8.35 ft bls the fill had a strong odor and a black shiny appearance. MW-42 soil cuttings, which were composed of fill (sand, gravel, and silt), and MW-43 soil samples, which consisted of clay fill (0-4 ft bls) overlying dark gray clay with gravel (6 ft to bedrock), were not stained and did not have an odor. Soil samples were collected from four soil borings installed within 10 feet of MW-6 in August 1986 by Ground Engineering and Testing Services (GETS). Soil borings G-1, G-2, G-3, and G-4 were installed approximately 6 ft north, 2.5 ft east, 7.5 ft south and 5 ft west of MW-6, respectively. The soil samples collected from 6 ft bls to the top of bedrock in these soil borings contained discolored (black) sandy clay with a distinct coal tar odor (Robison and Layton, 1987). Soil data indicates that stained soil with a coal tar odor occurs in the vicinity of MW-6 and extends southward to MW-41, which is located adjacent to the gas pipeline drip leg. The impacted soil extends from approximately 5 ft bls to the top of bedrock. A LNAPL was not observed in rock cuttings collected from MW-41, MW-42, and MW-43.

On June 14, 1999, prior to beginning the bail down test, 0.27 ft of LNAPL was present in MW-6 (Table 4-1). A LNAPL was not present in monitor wells MW-41, MW-42, MW-43, and MW-01. The approximate extent of LNAPL in the groundwater in the SWMU 13 and 21 area is presented on Figure 4-6. Although a LNAPL was not present in MW-41, the groundwater sample collected from MW-41 contained the same PAHs detected in historical groundwater data collected from MW-6 in August 1986 and March 1987 (Table 4-2). A sheen was observed on MW-6 prior to the March 1987 sampling.

Since monitor wells MW-6, MW-41, MW-42, and MW-43 are screened across the overburden/rock interface and LNAPL was not observed in the rock cuttings, it appears that the source of the LNAPL and PAHs in MW-6 and PAHs in MW-43 is most likely from the stained fill material overlying the bedrock.

Although the BTF and Sewers RFI Report indicated that MW-6 is located in the area that was impacted by the Sloss pre-RCRA stream, further evaluation of aerial photographs from 1957, 1967, 1970, and 1977 indicates that MW-6 is located on what used to be the south side of Summit Street (Figure 4-7). As discussed above, the deposition of sediment and material from Sloss Facility wastewater occurred on the north side of Summit Street. Prior to construction of the BTF, a right angle curve was present on Summit Street south of the BTF area. Between 1970 and 1977 during the time the BTF was constructed, the right angle curve on Summit Street was reconfigured, and Summit Street was shifted slightly south to its current location (Figure 4-7). The remnants of the right angle curve are present on a triangular piece of land located between the equalization basin and Summit Street where MW-1, MW-6, MW-5S, MW-5D, MW-41, MW-42, and MW-43 were installed (Figure 4-7).

Prior to construction of the BTF in 1975, there were three drainage ditches located south of Summit Street that discharged into the pre-RCRA stream formerly located in the BTF area. A Sloss drainage ditch, which was located west of MW-6 and MW-1, discharged wastewater and storm water into the BTF area (Figure 4-7). This drainage ditch was part of the current storm water runoff sewer. A second drainage was located west of MW-1 that received water from a dewatering operation at the LaFarge Quarry. This drainage ditch was part of the drainage ditch still located west of the LaFarge Quarry along the eastern boundary of the Sloss facility (Figure 4-7). Both of these drainage ditches appear to have discharged into the same culvert beneath Summit Street. A third drainage ditch bisected the area where MW-6 is located (Figure 4-7). This drainage ditch was part of the drainage ditch that is currently located west of Summit Street and Shuttlesworth Avenue and appears to have received wastewater or storm water from the Concrete Plant. After the BTF and BTF Sewer were constructed, wastewater from Sloss was transported by the underground sewer line to the BTF for treatment. The Sloss drainage ditch became the storm water runoff sewer and was rerouted to discharge into the polishing pond. The other two drainage ditches were rerouted to discharge into the drainage ditch located east of the BTF area that discharges directly into Five Mile Creek (Figure 4-7).

Several factors suggest that the source of the LNAPL in MW-6 was not from Sloss pre-RCRA waste disposal practices: (1) the Sloss pre-RCRA ditch did not bisect this area; (2) the odor of the LNAPL found in MW-6 (similar to lube oil with a hint of coal tar odor) was different than the odor of the LNAPL in MW-4A (coal tar); and (3) DNAPL is not present in MW-6. Since wastewater and storm water discharges from Concrete Plants do not usually contain PAHs, the gas pipeline drip leg located near MW-6 is most likely the source of the LNAPL. Condensate from the gas drip leg contains light oils and naphthalene and is most likely the source of the stained soil, the PAHs detected in MW-41, and the LNAPL in MW-6. The gas pipeline and drip leg are owned and operated by ABC Coke. The gas pipeline and drip leg are currently inactive.

4.1.4 MW-4A and MW-6 Bail Down Tests

From June 14, 1999 to June 22, 1999, bail down tests were performed on MW-4A and MW-6 to determine the recovery rate of the DNAPL and LNAPL, respectively. Prior to beginning the bail down test, the DNAPL thickness in MW-4A was 5.43 feet and the LNAPL thickness in MW-6 was 0.27 feet. The depth to water and depth to product measurements are presented in Table 4-1.

Over a period of 8 days, the rate of DNAPL recovery in MW-4A was approximately 0.40 feet per day (ft/day). Since only a sheen was observed in MW-6 eight days after the bail down test was started, the recovery rate of LNAPL was not calculated. Results from the August 26, 1999 product monitoring indicate that the DNAPL in MW-4A is still slowly recovering and a thin layer of LNAPL (0.01 ft) remains in MW-6 (Table 4-1).

4.1.5 Groundwater Quality

Groundwater data collected during the BTF and Sewers RFI in July and November 1998 and during the BTF and Sewers RFI Addendum in June 1999 were combined to evaluate the groundwater at SWMUs 13 and 21. In July and November 1998, eleven (11) groundwater samples (including one duplicate sample) were collected at monitor wells MW-1, MW-2, MW-5D, MW-5S, and MW-7 through MW-12 (Figure 4-6). Groundwater samples were not collected from monitor wells MW-3, MW-4A, and MW-6 because product was detected in these monitor wells. In June 1999, eight (8) groundwater samples (including one duplicate sample) were collected at monitor wells MW-38 through MW-44 (Figure 4-6).

Groundwater samples collected in July 1998 from MW-1, MW-8, MW-10, MW-12, and the duplicate were analyzed for Appendix IX constituents which includes VOCs, SVOCs, organochlorine (O-C) pesticides, organophosphorous (O-P) pesticides, polychlorinated biphenyls (PCBs), chlorinated herbicides, dioxins and furans, the

Appendix IX metals, cyanide, and sulfide (Table 4-6). The remaining wells sampled in 1998 and the seven wells sampled in 1999 were analyzed for VOCs, SVOCs, PP metals, barium, and cyanide. Field analyses conducted during groundwater sampling are summarized on Table 3-3.

The acid extractable portion of the SVOC data collected from MW-5S in July1998 was classified as unusable (R). MW-5S was resampled in November 1998 for SVOCs. Since the SVOC resampling data did not have any qualified data, the resampling data is being used in this report.

4.1.5.1 Volatile Organic Compounds

Five VOCs including benzene, carbon disulfide, chlorobenzene, toluene, and xylenes were detected in four (MW-10, MW-38, MW-40, and MW-41) of the 17 monitor wells sampled at SWMUs 13 and 21. A summary of the analytical results is presented in Table 4-3.

North of the equalization basin, the detected benzene concentrations in MW-10 (sample 980728-BT-13-GW0010), MW-38 (sample 990621-BT-13-GW0038), and MW-40 (sample 990618-BT-13-GW0040) were above the USEPA MCL of 5 micrograms per liter (ug/L) (Table 4-3). South of the equalization basin near MW-6, benzene was not detected (<5.0 ug/L) in sample 990617-BT-13-GW0041 collected from MW-41; however, 6 ug/L of benzene was detected in the duplicate sample (990617-BT-13-GW9041) collected from this well. Since the presence of benzene in the MW-41 duplicate is most likely the result of analytical variability, the sample 990617-BT-13-GW0041 result will be used to characterize the site groundwater. . The benzene concentrations detected in the BTF area groundwater are presented on Figure 4-6. Detected concentrations of the other VOCs were below their respective USEPA MCLs.

In the area north of the equalization basin, detectable concentrations of benzene are associated with the presence of DNAPL in the bedrock (Figure 4-6). Since the DNAPL contains benzene, it is most likely the source of the benzene detected in groundwater samples collected from MW-10, MW-38, and MW-40.

4.1.5.2 Semivolatile Organic Compounds

Fifteen PAHs, 1,2,4-trichlorobenzene, bis(2-ethylhexyl)phthalate, and dibenzofuran were detected in seven of the 17 monitor wells sampled at SWMUs 13 and 21. A summary of the analytical results is presented in Table 4-3.

North of the equalization basin, six PAHs, 1,2,4-trichlorobenzene, and bis(2-ethylhexyl)phthalate were detected in the groundwater (Table 4-3). Naphthalene was detected in MW-10 (sample 980728-BT-13-GW0010), MW-38 (sample 990621-BT-13-GW0038), MW-39 (sample 990621-BT-13-GW0039), and MW-40 (sample 990618-BT-13-GW0040) above the USEPA Tap Water RBC of 6.5 ug/L (Table 4-3). As shown on Figure 4-6, naphthalene and other PAHs were detected in monitor wells located near areas where DNAPL is present in the groundwater. Bis(2-ethylhexyl)phthalate was detected in one well, MW-12 (980727-BT-13-GW0012) at a concentration of 110 ug/L which was above the USEPA MCL of 6 ug/L.

South of the equalization basin in the MW-6 area, one PAH, naphthalene, was detected in MW-1 (sample 980724-BT-13-GW0001) at a concentration above the USEPA Tap Water RBC (Table 4-3). Fifteen PAHs and dibenzofuran were detected in MW-41 and its duplicate (samples 990617-BT-13-GW0041 and 990617-BT-13-GW9041) (Table 4-3). Concentrations of benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, and naphthalene detected in MW-41 and its duplicate were above their respective USEPA Tap Water RBCs. The concentration of benzo(a)pyrene detected in MW-41 exceeded both the USEPA MCL and Tap Water RBC for this compound. The PAHs detected in MW-41 were also detected in MW-6 when this well was sampled in 1986 and 1987 (Table 4-2).

In the area north of the equalization basin, detectable concentrations of PAHs are associated with the presence of DNAPL in the bedrock (Figure 4-6). Since the DNAPL contains PAHs, it is most likely the source of the PAHs detected in groundwater samples collected from MW-10, MW-38, MW-39, and MW-40. Since LNAPL was not detected in the bedrock cuttings south of the equalization basin and drainage ditch, the stained soil in the vicinity of MW-6 and MW-41 appears to be the source of the LNAPL and PAHs in this area.

4.1.5.3 Organochlorine and Organophosphorous Pesticides, Chlorinated Herbicides, Polychlorinated Biphenyls, Dioxins and Furans

O-C and O-P pesticides, chlorinated herbicides, PCBs, and dioxins and furans were not detected in groundwater samples collected in July 1998 from MW-1, MW-8, MW-10, MW-12, and the duplicate of MW-8 which were analyzed for Appendix IX constituents (Table 4-3).

4.1.5.4 Metals, Cyanide, and Sulfide

Cyanide and seven metals were detected in groundwater samples collected at SWMUs 13 and 21 (Table 4-3). Additionally, sulfide was detected in groundwater samples from MW-1, MW-8, MW-10, MW-12, and the duplicate of MW-8 which were analyzed for Appendix IX constituents. Detected arsenic, barium, chromium, copper, mercury and zinc concentrations were below USEPA MCLs.

North of the equalization basin, the concentrations of lead detected in MW-39 (sample 990621-BT-13-GW0039) and cyanide detected in MW-8 (sample 980725-BT-13-GW0008) and MW-9 (sample 980727-BT-13-GW0009) exceeded USEPA MCLs. However, the concentration of cyanide detected in the duplicate of MW-8 did not exceed the USEPA MCL.

South of the equalization basin, the concentrations of lead and cyanide detected in MW-41 and its duplicate (samples 990617-BT-13-GW0041 and 990617-BT-13-GW9041) exceeded USEPA MCLs.

4.1.6 Summary

SWMUs 13 and 21 are located east of the Opossum Valley Fault and are underlain by the Conasauga Formation. Measured dips of the Conasauga Formation range from 26° to 32° to the southeast. The soil overburden at nearby piezometers and monitor wells consist primarily of clay fill material and the soil thickness ranges from 6 to 24 ft .

In the vicinity of SWMUs 13 and 22, the observed groundwater elevations range from 521.58 to 530.37 ft amsl. The direction of groundwater flow is to the east toward the drainage ditch. In the SWMU 13 and 21 area, the hydraulic conductivities calculated from slug tests conducted on monitor wells installed in the Conasauga limestone are variable. The hydraulic conductivity variability appears to be related to the amount of fracturing present in the limestone, as well as, the amount of water present in the hard, soft and shaley areas of the limestone. Hydraulic conductivities calculated for monitor wells installed in portions of the Conasauga limestone where fractures were present range from 6.9×10^{-5} to 8.9×10^{-3} cm/sec. Hydraulic conductivities calculated for monitor wells installed in portions of the Conasauga limestone where fractures were not present range from 3.9×10^{-8} to 1.1×10^{-4} cm/sec.

Similar to the hydraulic conductivities, the groundwater flow velocities calculated for the Conasauga limestone are also variable. Calculated groundwater flow velocities for monitor wells installed in fractured portions of the Conasauga limestone range from 10 to 200 ft/yr, with the exception of MW-5S where a groundwater flow velocity of 1000 ft/yr was calculated. Calculated groundwater flow velocities for non-fractured portions of the limestone range from 0.1 to 150 ft /yr.

North of the equalization basin, the extent of DNAPL has been delineated. The DNAPL occurs in isolated pockets within the limestone bedrock. As discussed in the BTF and Sewers RFI, the DNAPL in the groundwater is most likely the result of pre-RCRA waste management practices. South of the equalization basin and drainage ditch, the extent of LNAPL in the vicinity of MW-6 has been delineated. The source of LNAPL appears to be the stained soil above the bedrock in this area. Several factors suggest that the source of the LNAPL in MW-6 was not from Sloss pre-RCRA waste disposal practices but from the ABC Coke gas pipeline drip leg located near MW-6. Condensate from the gas drip leg contains light oils and naphthalene and is most likely the source of the stained soil, the PAHs detected in MW-41, and the LNAPL in MW-6.

Over a period of 8 days, the rate of DNAPL recovery in MW-4A was approximately 0.40 ft/day. Since only a sheen was observed in MW-6 eight days after the bail down test was started, the recovery rate of LNAPL was not calculated. Results from the August 26, 1999 product monitoring indicate that the DNAPL in MW-4A is still slowly recovering and a thin layer of LNAPL remains in MW-6.

Five VOCs (benzene, carbon disulfide, chlorobenzene, toluene, xylenes), 18 SVOCs (15 PAHS, 1,2,4-trichlorobenzene, dibenzofuran, and bis(2-ethylhexyl)phthalate), seven metals, sulfide, and cyanide were detected in groundwater samples collected from the SWMU 13 and 21 area. O-C pesticides, O-P pesticides, PCBs, chlorinated herbicides, and dioxins and furans were not detected in the groundwater samples analyzed for Appendix IX constituents.

On the north side of the equalization basin, the USEPA MCLs for benzene, bis(2-ethylhexyl)phthalate, lead, and cyanide and the USEPA Tap Water RBC for naphthalene were exceeded. On the south side of the equalization basin, the USEPA MCLs for benzo(a)pyrene, lead, and cyanide and the USEPA Tap Water RBCs for benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, and naphthalene were exceeded in MW-41. MW-41 is located adjacent to the ABC Coke gas pipeline drip leg. The concentration of naphthalene detected in MW-1 also exceeded the USEPA Tap Water RBC.

In the area north of the equalization basin, detectable concentrations of benzene and PAHs are associated with the presence of DNAPL in the bedrock. Since the DNAPL contains benzene and PAHs , it is most likely the source of the benzene detected in groundwater samples. Since LNAPL was not detected in the bedrock cuttings south of the equalization basin and drainage ditch, the stained soil in the vicinity of the ABC Coke gas pipeline drip leg appears to be the source of the LNAPL and PAHs in this area.

4.1.7 Conclusions

North of the equalization basin, the extent of DNAPL, benzene, and naphthalene have been delineated in the groundwater at SWMUs 13 and 21. Since the Sloss pre-RCRA waste stream and SWMUs 13 and 21 do not appear to be the source of the LNAPL and PAHs in the MW-6 area and the ABC Coke gas pipeline drip leg is most likely the source, no further action is warranted in this area by Sloss Industries. Relative to the DNAPL located north of the equalization basin, Sloss intends to initiate a monthly monitoring program for monitor well MW-4A. On a monthly basis, the monitor well will be inspected to determine the presence and quantity of DNAPL present in the well. In addition to taking measurements, a bailer will be used to remove DNAPL from the monitor well..

4.2 BTF pH Neutralization Basin (SWMU 14), BTF Primary Clarifier (SWMU 15), BTF Aeration Basin (SWMU 16), BTF Secondary Clarifier (SWMU 17), BTF Thickener (SWMU 18), BTF Digester (SWMU 19), Dewatering Machine (SWMU 20)

4.2.1 Site Specific Geology and Hydrogeology

Site specific geology and hydrogeology for SWMUs 14 through 21 are discussed in Sections 4.2.1 and 4.2.2, respectively, of the BTF and sewers RFI Report (February 1999). Since BTF SWMUs 14 through 20 and SWMUs 13 and 21 are in close proximity, the site specific geology and hydrogeology for these SWMUs are the same. Therefore, site specific geology and hydrogeology sections for the BTF area SWMUs were not included in this report addendum. Refer to Sections 4.1.1 and 4.1.2 of this BTF and Sewers RFI Addendum Report for summaries of the geology and hyrogeology for SWMUs 13 and 21 and the BTF area.

4.2.2 Groundwater Quality

During the BTF and Sewers RFI, the extent of the benzo(a)pyrene in soil above the Industrial RBC was delineated (Figure 4-8). The source of the PAHs detected in soil samples collected above the bedrock (18-24 ft bls) appears to be residual material from the pre-RCRA stream and not the concrete basins of the BTF. Since the pre-RCRA stream bisected the BTF area, residual material, which was not removed during construction of the BTF, most likely remains in some areas (Figure 4-7).

With the low solubility of benzo(a)pyrene and other PAHs, it is unlikely these constituents will leach into the groundwater from the soil. To verify this assumption, monitor well MW-44 was installed at the location of soil boring 13-SB0010 and groundwater samples were collected and analyzed for VOCs, SVOCs, the PP metals, and cyanide.

Volatile organic compounds and semivolatile organic compounds including benzo(a)pyrene were not detected in MW-44 (Table 4-3). Additionally, benzo(a)pyrene was not detected in monitor wells MW-9, MW-10, MW-39, and MW-40 which are located in or near areas where benzo(a) pyrene was detected in soil above the bedrock (Figures 4-6 and 4-8). Other PAHs including naphthalene, 2-methynaphthalene, acenaphthene, fluoranthene, fluorene, and phenanthrene were detected in monitors wells (MW-10, MW-40, and MW-38) located in or near the area where DNAPL is present in the bedrock. Concentrations of naphthalene detected exceeded the USEPA Tap Water RBC. As discussed in Section 4.1.5.2, the source of the PAHs in these wells is most likely the DNAPL. Barium and cyanide were detected in MW-44 at concentrations below USEPA MCLs (Table 4-3).

4.2.3 Summary

One metal (barium) and cyanide were detected in MW-44. VOC and SVOCs were not detected in MW-44. Benzo(a)pyrene was not detected in MW-44 and other monitor wells installed in the BTF area. Several other PAHs were detected in the groundwater in or near the area where DNAPL is present in the bedrock; however, the source of these PAHs is most likely the DNAPL. The benzo(a)pyrene and other PAHs detected in soil above the bedrock do not appear to be leaching into the groundwater.

4.2.4 Conclusions

No further action is recommended for the soil in the BTF area because the benzo(a)pyrene and other PAHs detected in the soil do not appear to be impacting site groundwater and the results of the risk assessment indicate constituent concentrations in the subsurface soil at SWMUs 14 through 19 are unlikely to present unacceptable risks under assumed exposure scenarios

5. REFERENCES

ARCADIS Geraghty & Miller, Inc., 1999. RCRA Facility Investigation, BTF and Sewers, Sloss Industries Corporation, February 1999.

Bouwer, H. and R.C. Rice, 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Wells with Completely or Partially Penetrating Wells. Water Resources Research, Vol. 12, No. 3, pp. 423-428.

Geraghty & Miller, Inc., 1996. RCRA Facility Investigation, Facility-Wide Report, Sloss Industries Corporation. February 1996.

Geraghty & Miller, Inc., 1994. RCRA Facility Investigation Work Plan, Sloss Industries Corporation (Draft Final). November 1994.

Robinson and Layton, Inc., 1987. Groundwater Assessment Final Report, Jim Walter Resources, Inc. CIC Division. April 17, 1987.

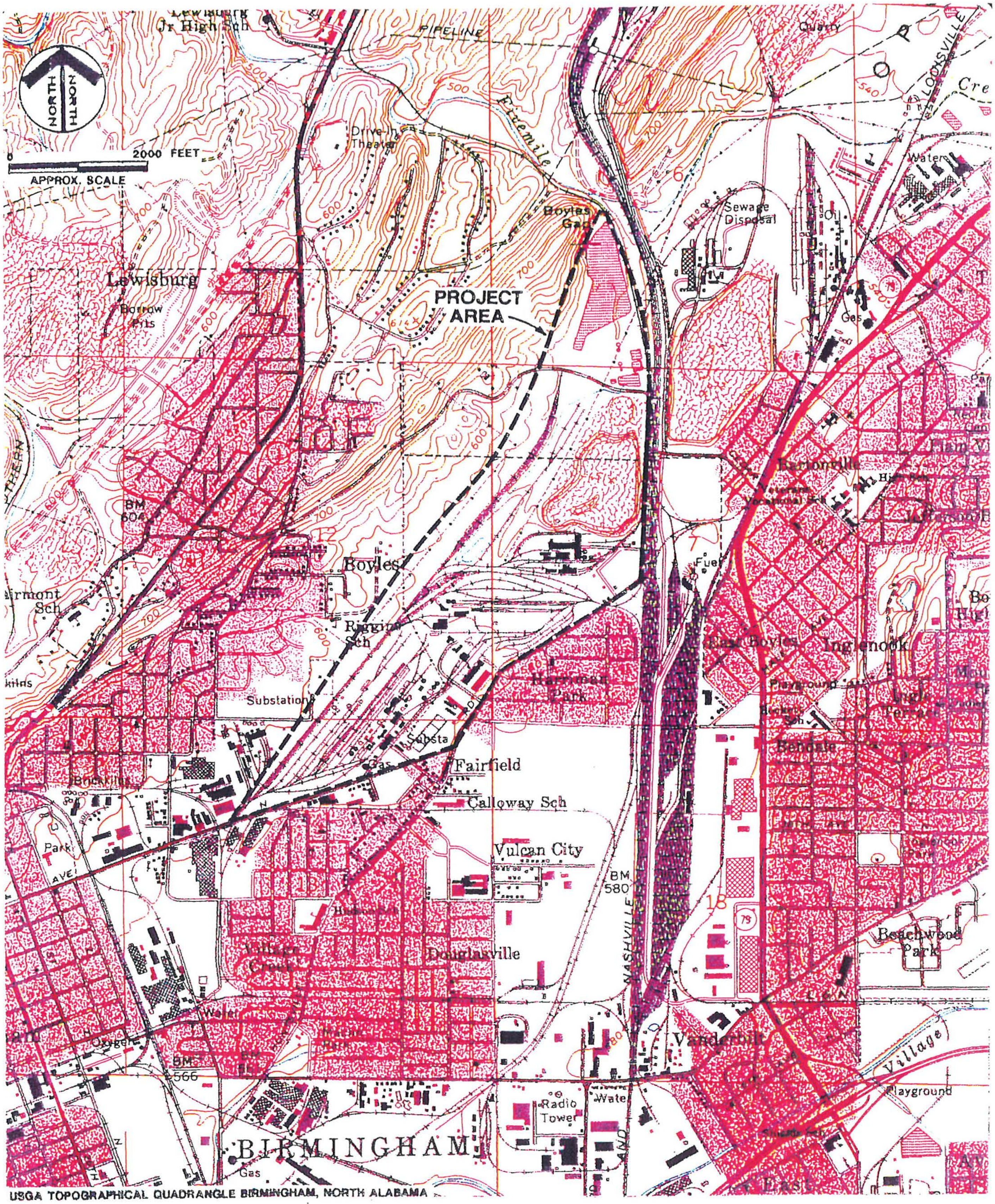
U.S. Environmental Protection Agency (USEPA), 1999. Region III Risk-Based Concentration Table. Office of RCRA, Technical and Program Support Branch. Philadelphia, PA, April 15, 1999.

U.S. Environmental Protection Agency (USEPA), 1990. Site Analysis of Sloss Industries Corporation, Birmingham, Alabama, Volume 1. Environmental Protection Agency Region 4, April 1990.

U.S. Environmental Protection Agency, 1983. Hazardous Waste Land Treatment. SW-874. Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency (USEPA), 1989a. RCRA Facility Assessment and Administrative Order (Docket #89-39-R).

FIGURES



USGA TOPOGRAPHICAL QUADRANGLE BIRMINGHAM, NORTH ALABAMA

ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

PROJECT LOCATION MAP

BTF AND SEWERS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE
1-1

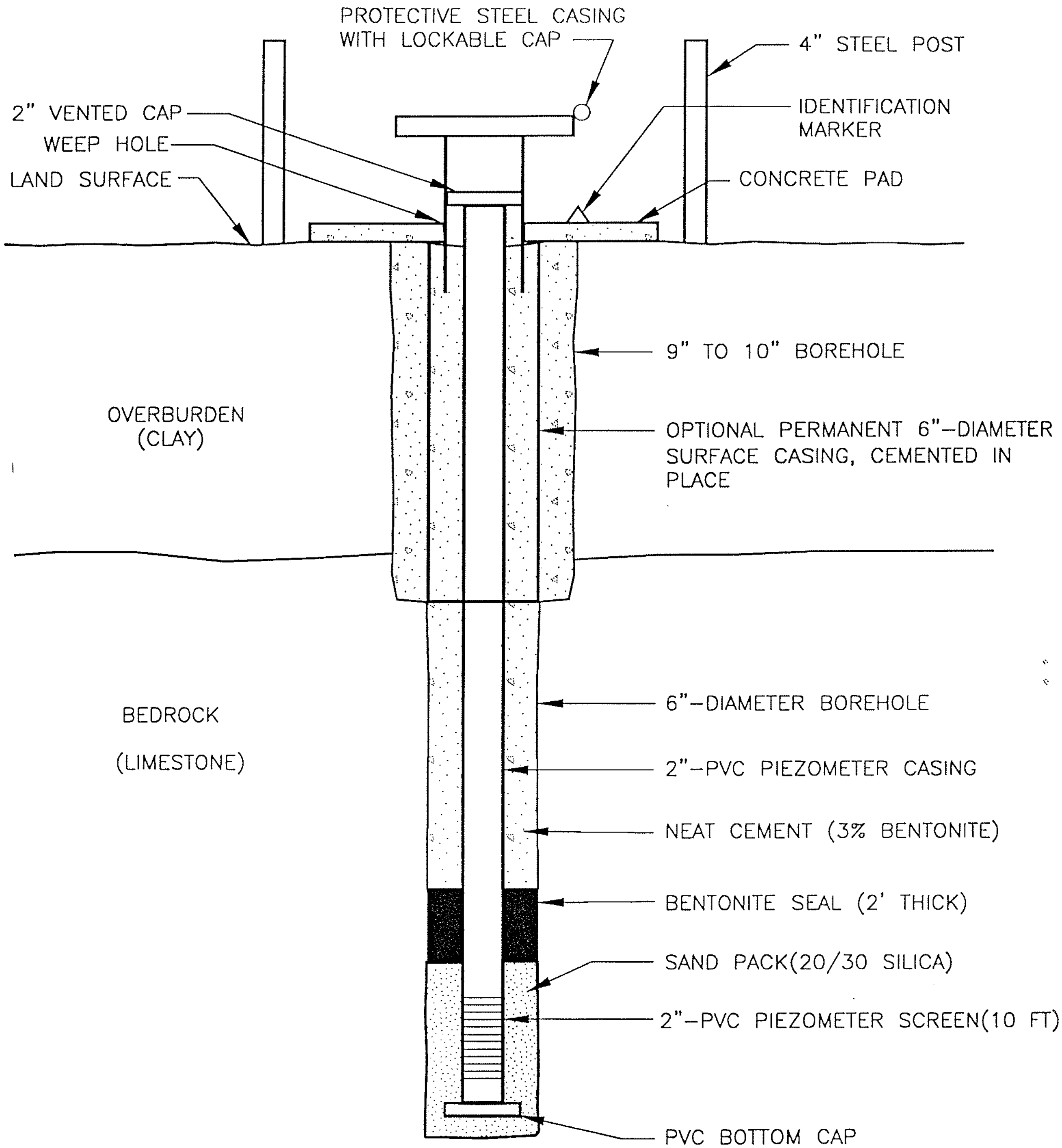
ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

DATE 10/26/99	PROJECT MANAGER PF	PROJECT OFFICER PF
DRAWN BJH	LEAD DESIGN PROF. KT	CHECKED KT
CADD FILE NAME SDNPLNP.DWG	PROJECT NUMBER TF000320.0016	

BTF AREA MONITOR WELL LOCATION MAP

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE NUMBER
3-1



NOT TO SCALE

10/12/99 | PRJCT NO.: TF0320.016 | DRAWING: SLPIEZ99.DWG | F O.: SLOSS | CHECKED: JK | APPROVED: PF | D R: BJH

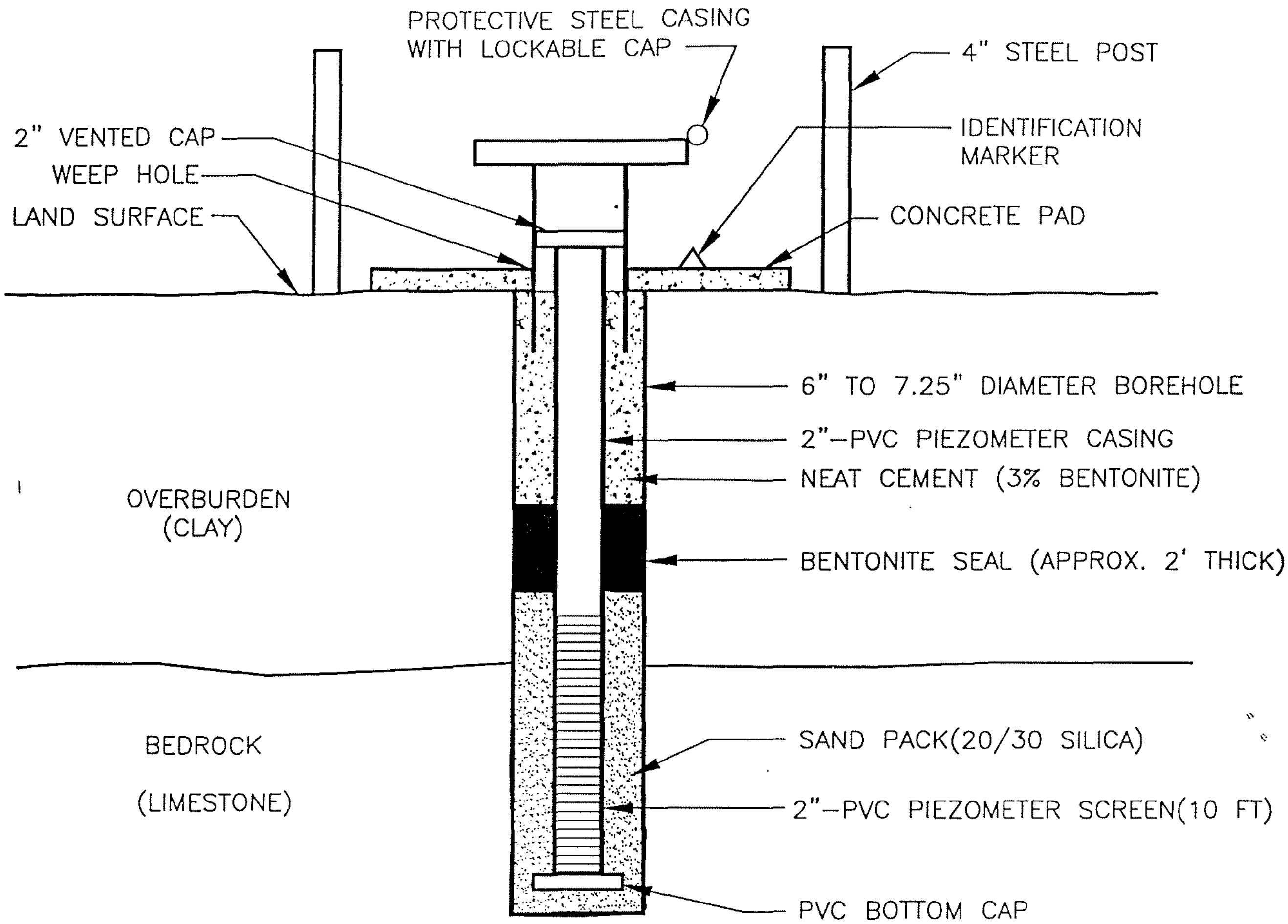
DWG

ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

TYPICAL BEDROCK MONITOR WELL DESIGN

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE
3-2



NOT TO SCALE

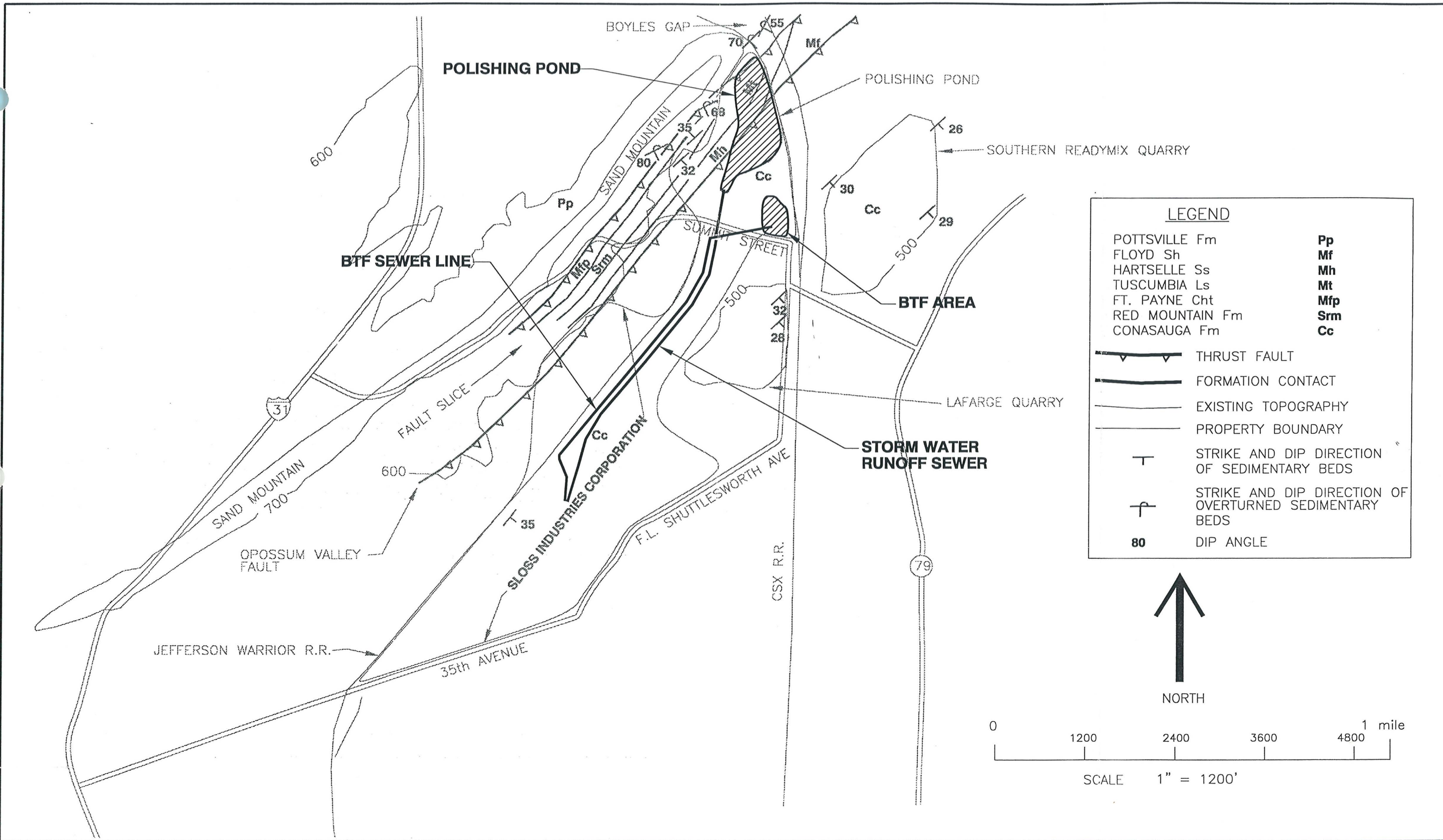
DWG 10/14/99 | PRJCT NO.: TF0320.016 | DRAWING: S2PIEZ99.DWG | P.O.: SLOSS | CHECKED: JK | APPROVED: PF | DRAFTER: BJH

ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

TYPICAL DNAPL AND LNAPL DELINEATION MONITOR WELL DESIGN

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE 3-3



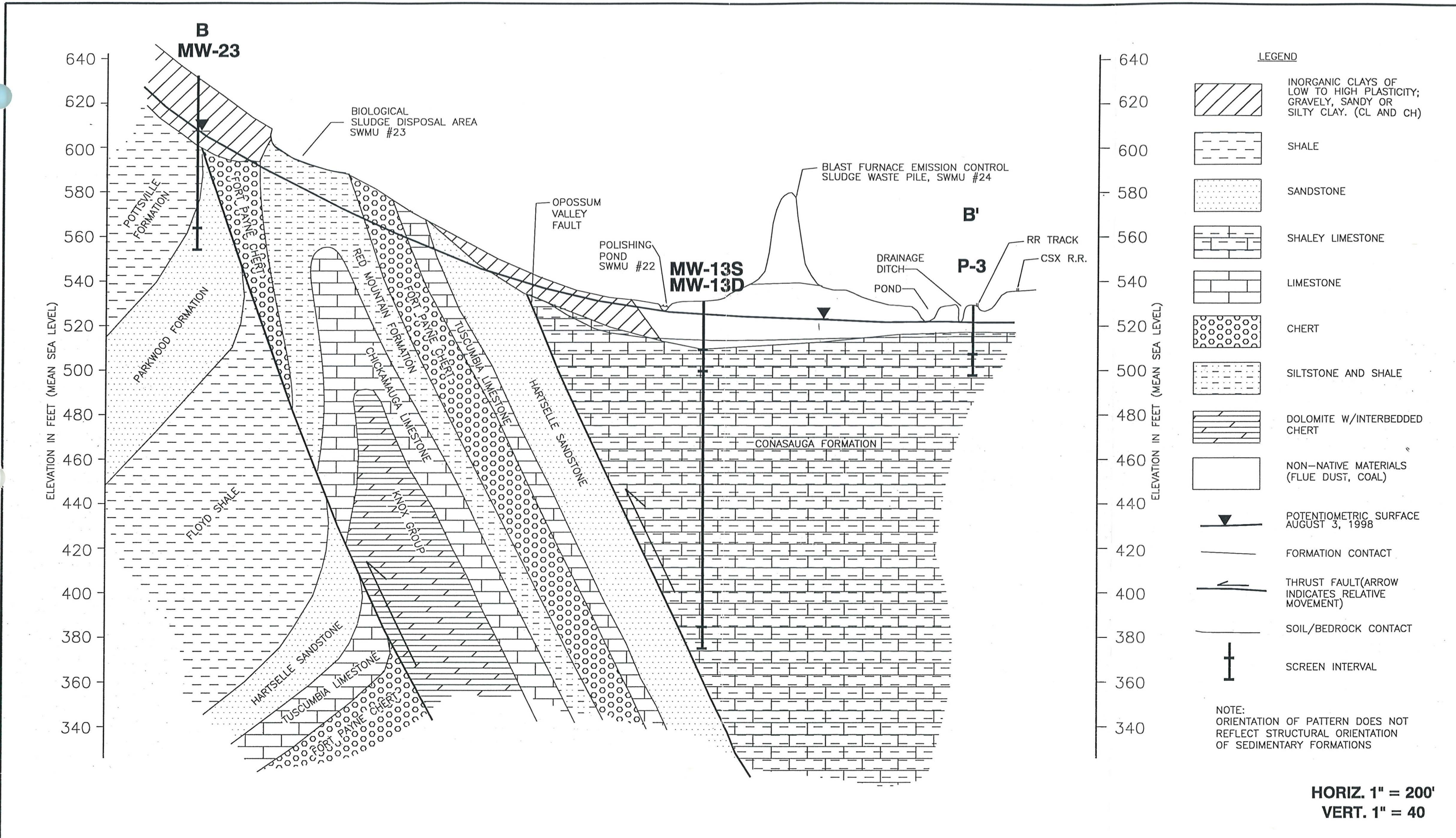
ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

DATE 10/14/99	PROJECT MANAGER KT	PROJECT OFFICER PF
DRAWN BJH	LEAD DESIGN PROF. KT	CHECKED KT
CADD FILE NAME SLO-GEO.DWG	PROJECT NUMBER TF000318.0016	

GEOLOGY OF THE SLOSS PROPERTY AND VICINITY

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE NUMBER 4-1



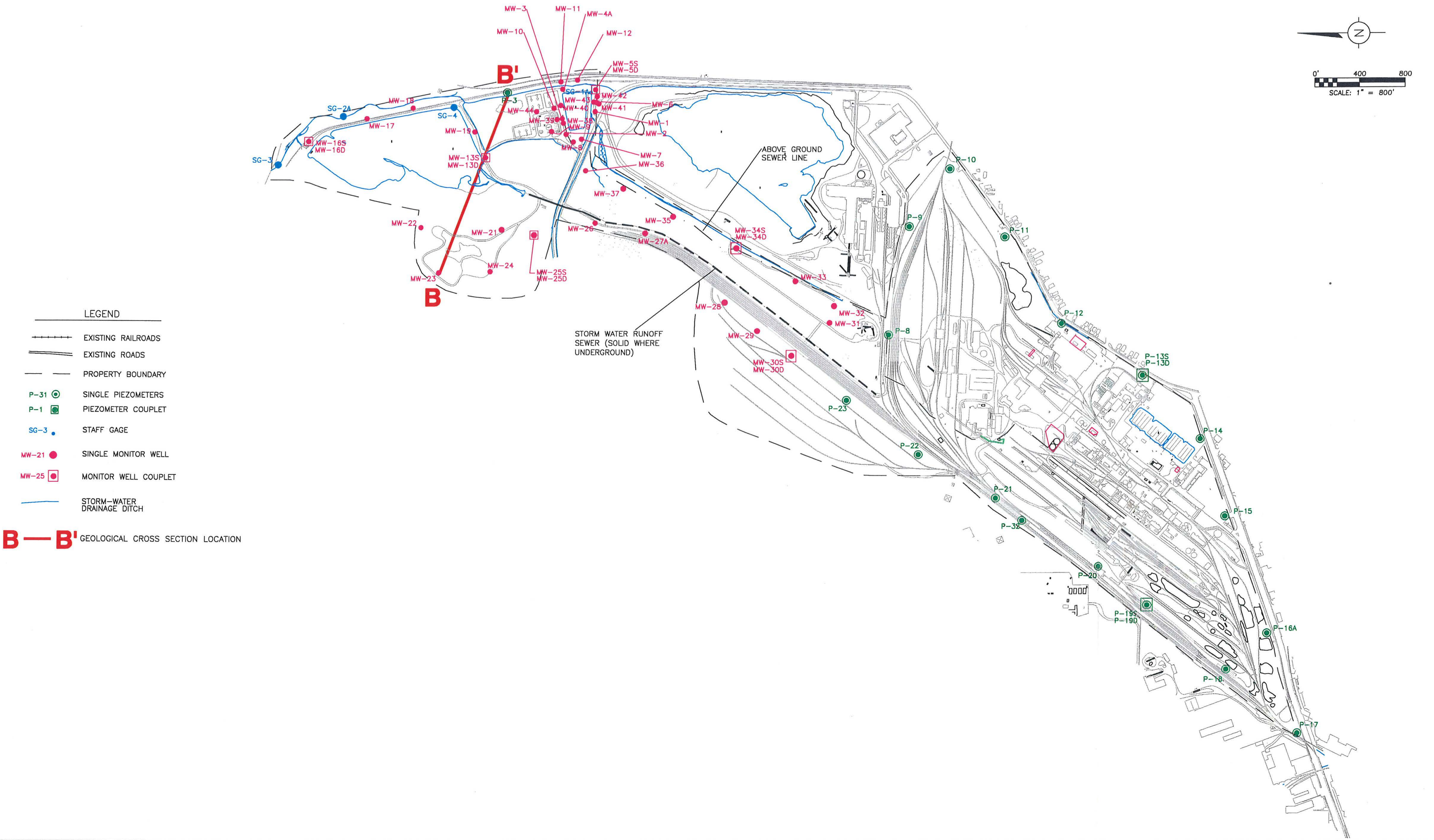
ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

DATE 10/14/99	PROJECT MANAGER PF	PROJECT OFFICER PF
DRAWN BJH	LEAD DESIGN PROF. KT	CHECKED KT
CADD FILE NAME SLO-S1.DWG	PROJECT NUMBER TF000320.0016	

GEOLOGICAL CROSS SECTION B-B'

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE NUMBER 4-2



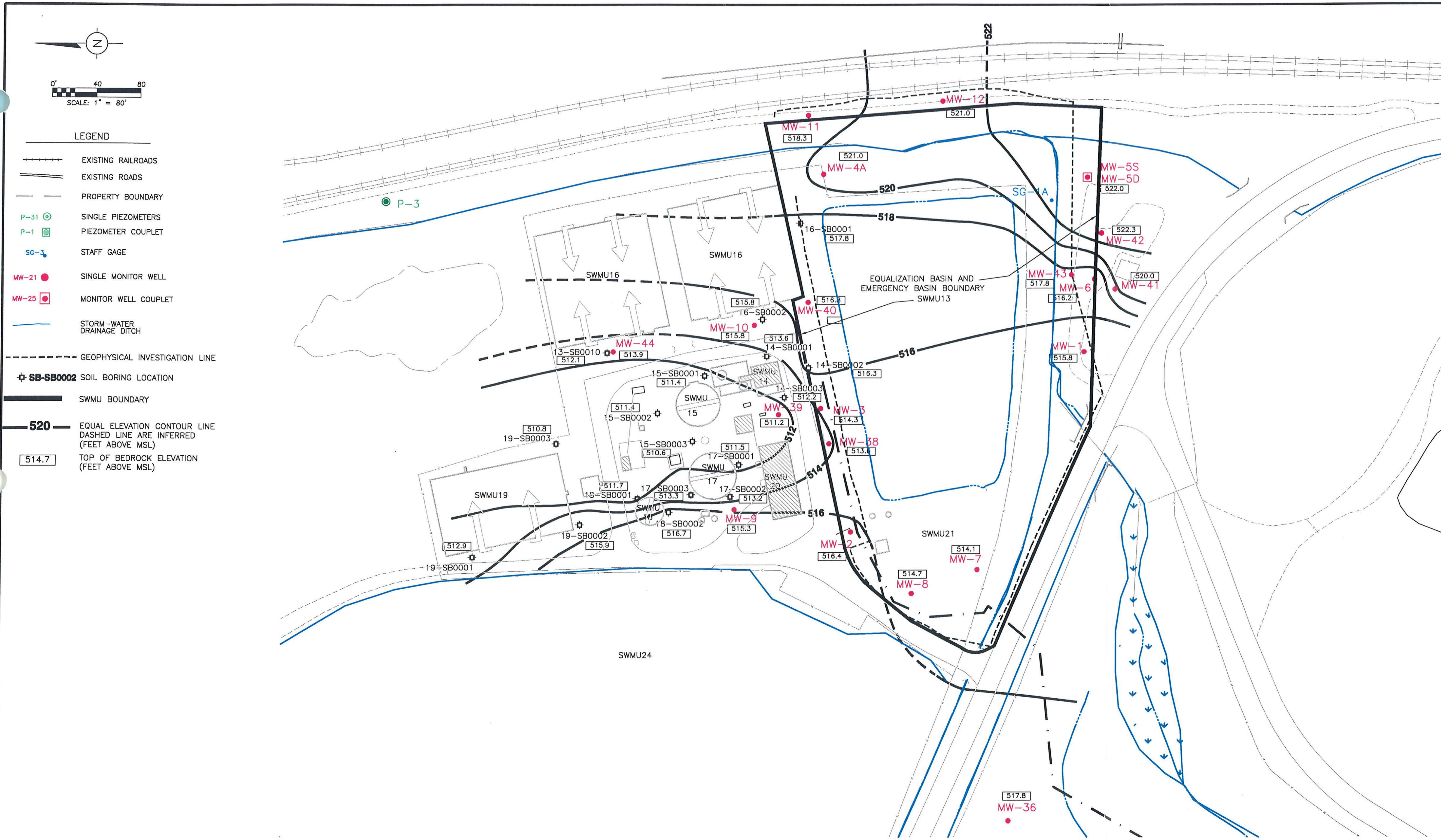
ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

DATE 10/12/99	PROJECT MANAGER PF	PROJECT OFFICER PF
DRAWN BJH	LEAD DESIGN PROF. KT	CHECKED KT
CADD FILE NAME SGXSEC99.DWG	PROJECT NUMBER TF000320.0016	

GEOLOGICAL CROSS SECTION LOCATION MAP

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE NUMBER
4-3



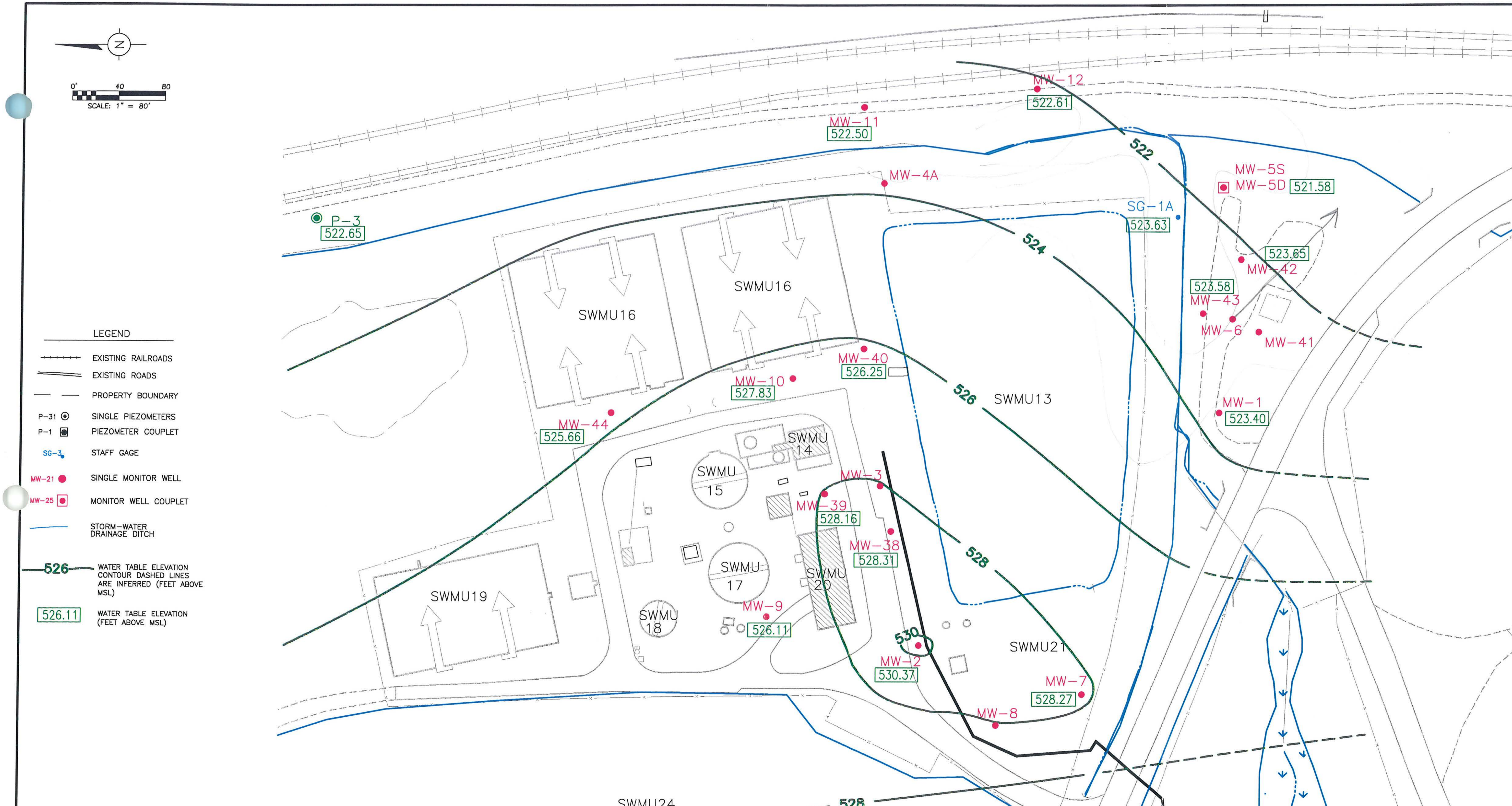
ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

DATE 10/28/99	PROJECT MANAGER PF	PROJECT OFFICER PF
DRAWN BJH	LEAD DESIGN PROF. KT	CHECKED KT
CADD FILE NAME SBROCK99.DWG	PROJECT NUMBER TF000320.0016	

SWMUs 13 AND 21 AND BTF AREA BEDROCK TOPOGRAPHY

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE NUMBER
4-4



NOTE:
MW-5S, MW-8, AND MW-41 WATER TABLE ELEVATIONS WERE NOT USED IN CONTOURING THIS MAP

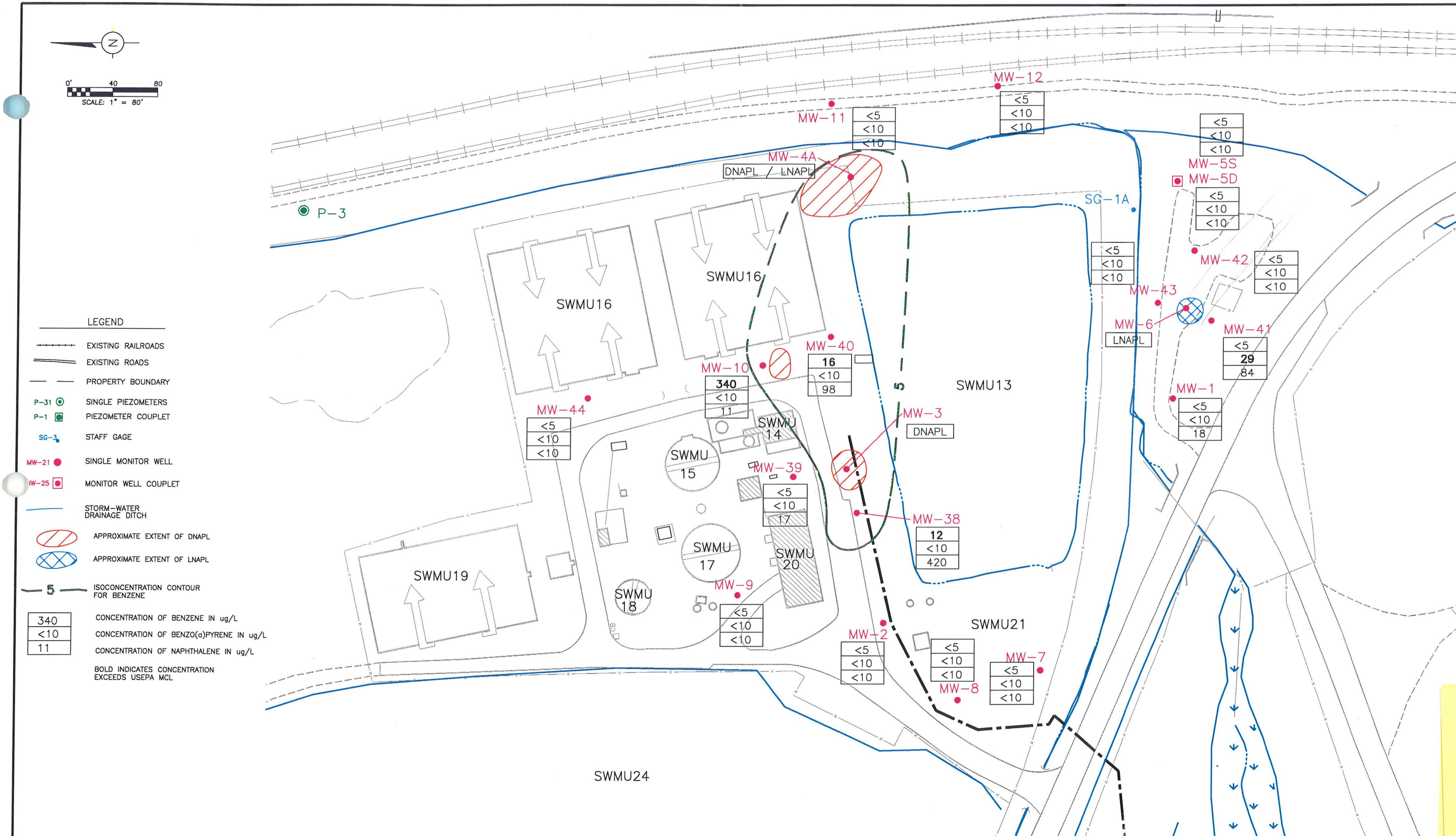
ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

DATE 9/23/99	PROJECT MANAGER PF	PROJECT OFFICER PF
DRAWN BJH	LEAD DESIGN PROF. KT	CHECKED KT
CADD FILE NAME SSAPSE99.DWG	PROJECT NUMBER TF000320.0016	

BTF AREA SHALLOW AQUIFER POTENTIOMETRIC SURFACE ELEVATIONS, JUNE 16, 1999

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE NUMBER
4-5



ARCADIS GERAGHTY & MILLER

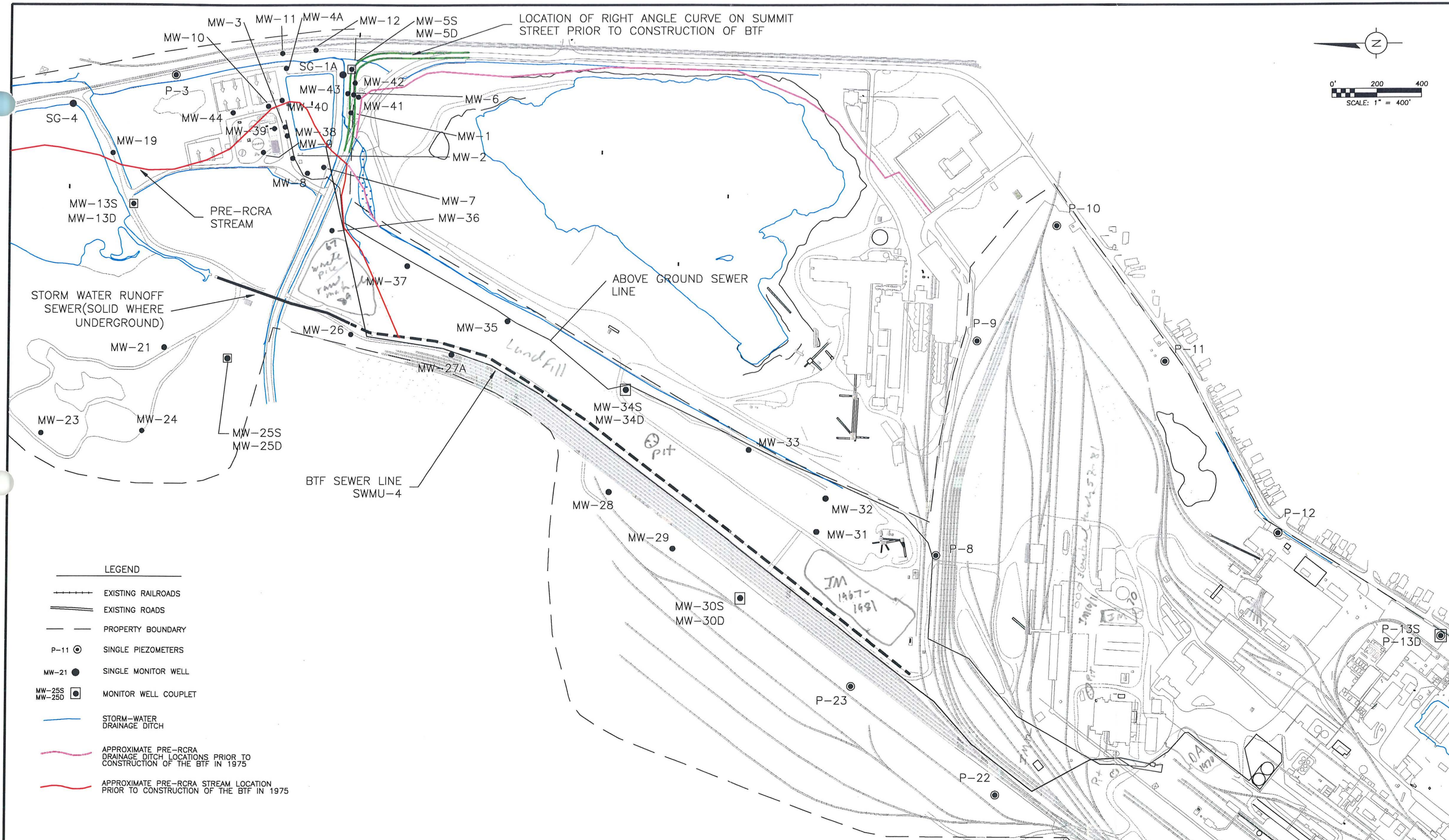
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

DATE 10/14/99	PROJECT MANAGER PF	PROJECT OFFICER PF
DRAWN BJH	LEAD DESIGN PROF. KT	CHECKED KT
CADD FILE NAME SDLBBP99.DWG	PROJECT NUMBER TF000320.0016	

EXTENT OF DNAPL, LNAPL, BENZENE, BENZO(a)PYRENE, AND NAPHTHALENE DETECTED IN BTF AREA GROUNDWATER IN 1998 AND 1999

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE NU
4-6



ARCADIS GERAGHTY&MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

DATE 10/27/99	PROJECT MANAGER PF	PROJECT OFFICER PF
DRAWN BJH	LEAD DESIGN PROF. KT	CHECKED KT
CADD FILE NAME SCP75D99.DWG	PROJECT NUMBER TF000320.0016	

CURRENT AND PRE-1975 DRAINAGE DITCHES IN THE VICINITY OF THE BTF AREA

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE NUMBER
4-7

ARCADIS GERAGHTY & MILLER
14497 North Dale Mabry Hwy., Suite 115
Tampa, Florida 33618
Tel: 813/961-1921 Fax: 813/961-2599

DATE 10/14/99	PROJECT MANAGER PF	PROJECT OFFICER PF
DRAWN BJH	LEAD DESIGN PROF. KT	CHECKED KT
CADD FILE NAME SBENPY99.DWG	PROJECT NUMBER TF000320.0016	

CONCENTRATIONS OF BENZO(a)PYRENE DETECTED IN SOIL SAMPLES COLLECTED AT SWMUs 14 THROUGH 19 IN JUNE 1998

BTF AND SEWERS RFI ADDENDUM
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE NUMBER
4-8

TABLES

ARCADIS GERAGHTY & MILLER

TABLE 1-1
Summary of SWMUs
BTF and Sewers RFI Addendum
Sloss Industries Corporation

SWMU No.	Name	Description	RFA Recommendation
Biological Treatment Facility (BTF) and Sewers SWMUs			
4	BTF Sewer	Inground sewer line	FA
13	BTF Equalization Basin	Surface impoundment	FA
14	BTF pH Neutralization Basin	Inground concrete tank	NFA
15	BTF Primary Clarifier	Inground concrete tank	NFA
16	BTF Aeration Basin	Inground concrete tank	NFA
17	BTF Secondary Clarifier	Inground concrete tank	NFA
18	BTF Thickener	Inground concrete tank	NFA
19	BTF Digester	Inground concrete tank	NFA
20	Dewatering Machine	Filter press	NFA
21	BTF Emergency Basin	Surface impoundment	FA
22	Polishing Pond	Surface impoundment	FA
25	Storm-Water Runoff Sewer	Inground sewer line	FA
37	BTF Sewer Tar Trap	Inground concrete basin	FA
Land Disposal Area SWMUs			
23	Biological Sludge Disposal Area	Land Disposal Area	FA
24	Blast Furnace Emission Control Sludge Waste Pile	Land Disposal Area	FA
38	Landfill	Land Disposal Area	FA
39	Blast Furnace Emission Control Sludge Waste Pile Near Landfill	Land Disposal Area	FA
Coke Manufacturing Plant SWMUs			
1	Quench Towers and Sump	Concrete tower and sump	FA
2	Quench Tower Pump Basins	Inground concrete tank	FA
3	Old Quench Tower Settling Basins	Inground concrete tank	FA
5	Coal Tar Storage Area Drain System	Inground concrete trough	FA
6	Spill Area Around Diesel Tank	Aboveground Tank	FA
7	Coal Tar Collection Sump in No. 1 Pump House	Concrete sump	FA
8	Flushing Liquor Decanter	Aboveground tank	FA
9	Flushing Liquor Decanter Sump	Concrete sump	FA
10	Coal Tar Decanter for No. 3 and No. 4 Coke Batteries	Aboveground tank	FA
11	Coal Tar Decanter for No. 5 Coke Battery	Aboveground tank	FA
12	Coal Tar Decanter for No. 1 and No. 2 Coke Batteries	Aboveground steel tank	FA

j:\proj\tf320\btfdnapl\Cswmu.xls
10/14/99 5:57 PM

ARCADIS GERAGHTY&MILLER

TABLE 1-1
Summary of SWMUs
BTF and Sewers RFI Addendum
Sloss Industries Corporation

SWMU No.	Name	Description	RFA Recommendation
Chemical Manufacturing Plant SWMUs			
26	Chemical Manufacturing Plant Main Process Building Floor Drain	Tile-lined trough	FA
27	TSA 94 Building Drain Floor	Tile-lined trough	FA
28	Sulfonation Building Floor Drain	Stainless Steel trough	NFA
29	Chemical Product Tank Containment Area	Concrete containment area	FA
30	Centrifuge Wastewater Tank	Aboveground Steel Tank	NFA
31	Monohydrate Building Floor Drain and Sump	Concrete drain and sump	FA
32	BSC 94 Drum Storage Area	Plastic drums	NFA
33	BSC Plant Drum Storage Area	Plastic drums	NFA
34	BSC Wastewater Neutralization System	Concrete containment	NFA
35	Old Waste Pile at Mineral Wool Plant	Land Disposal Area	NFA
36	Maintenance Shop Used Oil Tank	Aboveground tank	FA

FA Further Action.
NFA No Further Action.

Table 3-1
Summary of Monitor Well and Piezometer Construction
Details and June 16, 1999 Groundwater Elevations
BTF and Sewers RFI Addendum
Sloss Industries Corporation

Monitor Well/ Piezometer Identification	Previous Identification	SWMU Area	SWMU	Date Completed	Measuring Point Elevation [2/] (ft amsl)	Surface Elevation (ft amsl)	Monitor Well/ Piezometer Depth (ft bls)	Screen Interval (ft bls)	Depth to Water 6/19/99 (ft btoc)	Water Table Elevation [3/] 6/19/99 (ft amsl)
MW-1		BT	SWMU 13		531.53	529.33	28	18 - 28	8.13	523.4
MW-2		BT	SWMU 13		536.42	534.37	28	18 - 28	6.05	530.37
MW-3		BT	SWMU 13		536.13	534.3	45	35 - 45	NM	NM
MW-4A		BT	SWMU 13	2/4/87	535.66	532.81	19	11.8 - 19	NM	NM
MW-5D	P-04	BT	SWMU 13	7/26/95	532.4	529.48	37.5	27.5 - 37.5	10.82	521.58
MW-5S	MW-05	BT	SWMU 13		532.05	529.89	18	8 - 18	7.75	524.3
MW-6		BT	SWMU 13		531.7	529.18	18	8 - 18	NM	NM
MW-7		BT	SWMU 13	7/16/98	540.34	538.08	41.5	31.5 - 41.5	12.07	528.27
MW-8		BT	SWMU 13	7/15/98	541.06	538.65	69	59 - 69	15.37	525.69
MW-9		BT	SWMU 13	7/13/98	536.71	534.32	38.5	28.5 - 38.5	10.6	526.11
MW-10		BT	SWMU 13	7/23/98	536.83	534.78	58	48 - 58	9	527.83
MW-11		BT	SWMU 13	7/11/98	531.61	529.3	30	20 - 30	9.11	522.5
MW-12		BT	SWMU 13	7/13/98	531.3	528.94	26.5	16.5 - 26.5	8.69	522.61
MW-13D		BT	SWMU 22	7/17/98	532.42	530.07	160	150 - 160	92.08	440.34
MW-13S		BT	SWMU 22	7/20/98	532.37	530.15	55	45 - 55	5.25	527.12
MW-16D	P-01D	BT	SWMU 22	7/13/95	523.02	520.57	44.5	34.5 - 44.5	16.99	506.03
MW-16S	P-01S	BT	SWMU 22	7/25/95	522.76	520.26	21	11 - 21	16.3	506.46
MW-17		BT	SWMU 22	7/15/98	528.02	525.78	57.5	47.5 - 57.5	25.03	502.99
MW-18	P-02	BT	SWMU 22	7/18/95	531.53	528.5	35.5	25.5 - 35.5	13.89	517.64
MW-19		BT	SWMU 22	7/14/98	527.53	525.21	33.5	23.5 - 33.5	3.18	524.35
MW-21		LD	SWMU 23	8/9/97	558.85	556.58	39	29 - 39	14.71	544.14
MW-22	P-31	LD	SWMU 23	7/20/95	628.86	625.7	118.5	108.5 - 118.5	94.01	534.85
MW-23	P-30	LD	SWMU 23	7/27/95	635.88	632.94	78.5	68.5 - 78.5	31.14	604.74
MW-24	P-29	LD	SWMU 23	7/26/95	594.99	591.81	73.3	63.3 - 73.3	13.92	581.07
MW-25D	P-28D	LD	SWMU 23	7/26/95	559.63	556.87	66.3	56.3 - 66.3	17.09	542.54
MW-25S	P-28S	LD	SWMU 23	7/20/95	559.67	556.76	45.5	35.5 - 45.5	17.78	541.89
MW-26	P-27	LD	SWMU 38	6/20/95	549.58	547.41	140.5	130.5 - 140.5	86.16	463.42
MW-27A		LD	SWMU 38	7/17/98	554.61	551.98	37	27 - 37	15.38	539.23

Footnotes on Page 2

Table 3-1
Summary of Monitor Well and Piezometer Construction
Details and June 16, 1999 Groundwater Elevations
BTF and Sewers RFI Addendum
Sloss Industries Corporation

Monitor Well/ Piezometer Identification	Previous Identification	SWMU Area	SWMU	Date Completed	Measuring Point Elevation 2/ (ft amsl)	Surface Elevation (ft amsl)	Monitor Well/ Piezometer Depth (ft bls)	Screen Interval (ft bls)	Depth to Water 6/19/99 (ft btoc)	Water Table Elevation 3/ 6/19/99 (ft amsl)
MW-35		LD	SWMU 39	8/14/97	542.46	540.12	29.5	19.5 - 29.5	7.43	535.03
MW-36	P-05	LD	SWMU 39	6/23/95	532.43	530.34	136.5	126.5 - 136.5	NM 1/	NM
MW-37		LD	SWMU 38	8/11/97	537.44	535.36	30	20 - 30	4.38	533.06
MW-38		BT	SWMU 13	6/9/99	534.49	534.61	29.5	19.5 - 29.5	6.18	528.31
MW-39		BT	SWMU 13	6/9/99	534.33	534.45	32	22 - 32	6.17	528.16
MW-40		BT	SWMU 13	6/8/99	537.67	535.04	27.5	17.5 - 27.5	11.42	526.25
MW-41		BT	SWMU 13	6/10/99	530.92	528.21	15.5	5.5 - 15.5	6.37	524.55
MW-42		BT	SWMU 13	6/11/99	530.81	528.78	15.5	5.5 - 15.5	7.16	523.65
MW-43		BT	SWMU 13	6/10/99	532.16	529.54	20	10 - 20	8.58	523.58
MW-44		BT	SWMU 13	6/12/99	536.03	533.92	37.75	27.75 - 37.75	10.37	525.66
P-3		FW		7/21/95	532.98	530.17	32	22 - 32	10.33	522.65
Staff Gages										
SG-1A		FW			525.66				1.3	523.63

Footnotes:

ft amsl	Feet above mean sea level.
ft bls	Feet below land surface.
ft btoc	Feet below top of casing.
NM	Not Measured.
FW	Facility-Wide.
LD	Land Disposal Areas.
BT	BTF and Sewers.
1/	Flowing Well.
2/	Top of casing for monitor wells and piezometers, top of staff gage for staff gages SG-1A.
3/	Surface water elevation at staff gages SG-1A was calculated by the following formula: [Measuring point elevation]-[3.33 - (surface water level on staff gage)].

TABLE 3-2
Summary of In-Situ Permeability Testing for SWMUs 13 and 21 and BTF SWMUs 14 through 19
BTF and Sewers RFI Addendum
Sloss Industries Corporation

Well	Well Depth (ft bls)	Lithology Screened	K (cm/sec) Slug In	K (cm/sec) Slug Out	i (ft/ft)	n	v (ft/min) Slug In	v (ft/min) Slug Out	v (ft/year) Slug In	v (ft/year) Slug Out
Conasauga Limestone SWMUs 13 and 21 and SWMUs 14 through 20										
Nonfractured limestone:										
MW-1	28	LS	9.9E-05	1.1E-04	0.013	0.20	1 E-05	1 E-05	10	10
MW-3	45	LS	1.3E-05	1.9E-06	0.013	0.01	3 E-05	5 E-06	20	2
MW-4A	19	Hard LS	NA	NA	0.013					
MW-10	58	Hard LS & soft shaley LS	1.1E-04	5.1E-05	0.013	0.01	3 E-04	1 E-04	150	100
MW-5D	37.5	Hard & soft LS; LS & shale	1.2E-06	3.9E-08	0.013	0.01	3 E-06	1 E-07	2	0.1
Minimum			1.2E-06	3.9E-08					2	0.1
Maximum			1.1E-04	1.1E-04					150	100
Fractured limestone:										
MW-5S	18	Fractured LS	1.4E-03	8.9E-03	0.013	0.20	2 E-04	1 E-03	100	1000
MW-7	41.5	Fractured, hard, & soft LS	3.0E-03	2.4E-03	0.013	0.20	4 E-04	3 E-04	200	200
MW-8	69	Fratured & hard LS	2.7E-03	2.0E-03	0.013	0.20	3 E-04	2 E-04	200	100
MW-9	38.5	Soft, & hard fractured LS	2.7E-04	2.2E-04	0.013	0.20	3 E-05	3 E-05	20	10
MW-11	30	Hard, soft, & fractured LS	9.1E-05	6.9E-05	0.013	0.01	2 E-04	2 E-04	100	100
MW-12	26.5	Fractured and soft LS	2.3E-04	1.8E-04	0.013	0.20	3 E-05	2 E-05	10	10
MW-44	37.75	Soft to hard LS with calcite veins	7.4E-04	1.5E-03	0.013	0.20	9 E-05	2 E-04	50	100
Minimum			9.1E-05	6.9E-05					10	10
Maximum			3.0E-03	8.9E-03					200	1000
Overburden/Conasauga Limestone SWMUs 13 and 21										
MW-2	28	Clay/LS	3.5E-03	1.1E-03	0.013	0.20	4 E-04	1 E-04	200	100
MW-6	18	Clay/LS	NA	NA	0.013					
MW-38	29.5	Clay/Hard & soft LS	5.9E-03	5.0E-03	0.013	0.20	7 E-04	6 E-04	400	300
MW-39	32	Cly/Hard & soft LS	7.5E-04	7.1E-04	0.013	0.20	9 E-05	9 E-05	50	50
MW-40	27.5	Clay/Fractured, hard & soft LS	4.5E-05	2.9E-05	0.013	0.01	1 E-04	7 E-05	60	40
MW-41	15.5	Sd & Gr w cly/Fractured, hard & soft LS	2.5E-03	2.1E-03	0.013	0.20	3 E-04	3 E-04	200	100
MW-42	15.5	Sd w gr & silt/Fractured, hard and soft LS	2.3E-03	1.0E-03	0.013	0.20	3 E-04	1 E-04	100	70
MW-43	20	Clay w gr & sd/Fractured & hard LS	NC	NC	0.013	0.20				
Minimum			4.5E-05	2.9E-05					50	40
Maximum			5.9E-03	5.0E-03					400	300

Footnotes: cm/sec - Centimeters per second.
ft/ft - Feet per feet.
ft/min - Feet per minute.
ft/year -Feet per year.
K - Hydraulic permeability.
i - Hydraulic gradient.
n - Porosity (void volume / total volume).
v - Velocity = K i / n.
ft bls - Feet below land surface.
NA- Not available due to free product in well.
NC - The accuracy of the slug test data was suspect so the K value was not calculated.

j:/proj/tf320/btfdnapl/field/REVBTFKSUM.xls 10/14/99 6:03 PM

ARCADIS GERAGHTY&MILLER

TABLE 3-3
Results of Field Analyses for Groundwater Samples Collected at SWMUs 13 and 21and SWMUs 14 through 19 in June 1999
BTF and Sewers RFI Addendum
Sloss Industries Corporation

Location	Sample ID	Date	pH (std units)	Temperature (oC)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTUs)	Appearance
MW-38	990621-BT-13-GW0038	6/21/99	6.80	22.5	970	1.55	9.4	Clear
MW-39	990621-BT-13-GW0039	6/21/99	6.67	23.5	920	1.12	15.7	Clear
MW-40	990618-BT-13-GW0040	6/18/99	6.38	23	1100	1.98	>200	Turbid
MW-41	990617-BT-13-GW0041	6/17/99	7.38	23	1030	1.40	58.8	Slightly turbid
MW-42	990617-BT-13-GW0042	6/17/99	6.79	23	780	1.63	45	Clear
MW-43	990617-BT-13-GW0043	6/17/99	6.91	20	1000	1.46	>200	Slightly turbid
MW-44	990621-BT-13-GW0044	6/21/99	7.14	22	850	1.05	3.60	Clear

Footnotes:

std units	Standard Units.
°C	Degrees Centigrade.
umhos/cm	Micromhos per centimeter.
mg/L	Milligrams per liter.
NTU	Nephlemetric Turbidity Units.

51

g:/proj/tf320/BTFDNAPL/GWPARAMSUM.xls

CADIS GERAGHTY & MILLER

TABLE 4-1
Bail Down Test Results for MW-4A and MW-6
BTF and Sewers RFI Addendum
Sloss Industries Corporation

Well	Date	Time	Depth to Water (ft btoc)	Depth to Product (ft btoc)	Product Thickness (ft)	Remarks
MW-4A	6/14/99	1610	9.90	16.37	5.43	Bailed 0.8 gallons of DNAPL
	6/15/99	1040	13.10	21.20	0.60	
	6/17/99	1602	NM	20.65	NM	Suspect LNAPL at top of column
	6/19/99	1425	13.60	19.95	1.85	
	6/22/99	1750	12.70	19.60	2.20	
	8/26/99	NA	13.84	18.04	3.76	
MW-6	6/14/99	1630	8.54	8.27	0.27	Purged LNAPL
	6/14/99	1640	8.77			
	6/14/99	1650	8.47			Sheen
	6/14/99	1700	8.36			Sheen
	6/14/99	1719	8.33	8.32	0.01	
	6/15/99	1519	8.26	8.25	0.01	
	6/17/99	1554	8.23			Sheen
	6/19/99	1435	8.38			
	6/22/99	1800	8.58			
	8/26/99	NA	8.64	8.63	0.01	

Footnotes:
ft btoc- Feet below top of casing
ft- Feet
NM- Not measured
NA - Not Available
DNAPL - Dense non-aqueous phase liquid.
LNAPL - Light non-aqueous phase liquid.
Note: The depth of MW-4A is 21.8 ft btoc.

ARCADIS GERAGHTY&MILLER

TABLE 4-2
Summary of MW-6 and MW-41 Groundwater Data
BTF and Sewers RFI Addendum
Sloss Industries Corporation

Compound	USEPA MCL	MW-6 4/17/86	MW-6 8/4/86	MW-6 3/3/87	990617-BT-13-GW0041 6/17/99	990617-BT-13-GW9041 6/17/99
Volatile Organic Compounds (ug/L):						
Benzene	5	NA	NA	1.1 J	<5	6
Chlorobenzene	100	NA	NA	1 J	<5	<5
Xylenes	10000	NA	79.3	2.1 J	<5	<5
Semivolatile Organic Compounds (ug/L):						
Acenaphthene	370 1/	<5.0	253	75	39	36
Acenaphthylene	NS	<5.0	10.3	1.8 J	<10	<10
Anthracene	1800 1/	<5.0	271	20	25	25
Benzo(a)anthracene	0.092 1/	6.9	44	5.9 J	23	23
Benzo(a)pyrene	0.2	<5.0	31.4	3.8 J	29	28
Benzo(b)fluoranthene	0.092 1/	<5.0	53.1	3.4 J	23	23
Benzo(g,h,i)perylene	NS	<5.0	<1.0	1.3 J	13	14
Benzo(k)fluoranthene	0.92 1/	<5.0	*	*	21	29
Chrysene	9.2 1/	10.8	106	4.8 J	26	25
Fluoranthene	1500 1/	49.9	42	31	140	140
Fluorene	240 1/	<5.0	332	76	31	30
Indeno(1,2,3-cd)pyrene	0.092 1/	<5.0	<1.0	1.4 J	15	14
Naphthalene	6.5 1/	<5.0	3023	3.2 J	84 J	65 J
Phenanthrene	NS	153.4	<0.1	54	120	120
Pyrene	180 1/	24.7	570	21	69	73
2,4-Dimethylphenol	730 1/	<5.0	57.6	NA	<10	<10
Phenol	22000 1/	NA	NA	1.4 J	<10	<10
1-Methylnaphthalene	NS	NA	NA	100 JN	33	29
Dibenzofuran	24 1/	NA	NA	57	17	16
Cyanide, Total (mg/L):	0.2	0.072	NA	0.28	0.26	0.25

Footnotes:

NA	Not Analyzed.
NS	No Standard.
mg/L	Milligrams per liter.
ug/L	Micrograms per liter.
J	Estimated Value.
N	Presumptive evidence of presence of material
*	Cannot tell the difference between benzo(b)fluoranthene and benzo(k)fluoranthene.
1/	USEPA Region III Risk Based Concentrations (RBCs) for Tap Water, April 15, 1999.
[box]	Concentration exceeds USEPA MCL or USEPA Tap Water RBC.

TABLE 4-3
Summary of Constituents Detected in Groundwater Samples Collected at SWMUs 13 and 21 and BTF SWMUs in 1998 and 1999
BTF and Sewer RFI Addendum
Sloss Industries Corporation

Chemical Lab Sample ID Sample Date	USEPA MCL	980724-BT-13-GW0001 97687-4 & 97691-3 7/24/98	980727-BT-13-GW0002 97698-2 7/27/98	980724-BT-13-GW0005D 97687-5 7/24/98	980724-BT-13-GW0005S 97687-6 7/24/98	981103-BT-13-GW0005S 101195-1 11/3/98	981103-BT-13-GW9005S 101195-5 11/3/98	980724-BT-13-GW0007 97687-9 7/24/98	980725-BT-13-GW0008 97658-4 & 97682-1 7/25/98
Volatile Organic Compounds (ug/L):									
Benzene	5	<5	<5	<5	<5	NA	NA	<5	<5 UJ
Carbon disulfide	1000 1/	<5	<5	<5	<5	NA	NA	<5	<5
Chlorobenzene	100	<5	<5	<5	<5	NA	NA	<5	<5
Toluene	1000	<2	<2	<2	<2	NA	NA	<2	<2 UJ
Xylenes	10000	<5	<5	<5	<5	NA	NA	<5	<5
Semivolatile Organic Compounds (ug/L):									
1,2,4-Trichlorobenzene	70	<10	<10	<10	<10	<10	<10	<10	<10
2-Methylnaphthalene	120 1/	<10	<10	<10	<10	<10	<10	<10	<10
Acenaphthene	370 1/	<10	<10	<10	<10	<10	<10	<10	<10
Anthracene	1800 1/	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(a)anthracene	0.092 1/	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(a)pyrene	0.2	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	0.092 1/	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	NS	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	0.92 1/	<10	<10	<10	<10	<10	<10	<10	<10
Bis(2-ethylhexyl)phthalate	6	<10	<10	<10	<10	<10	<10	<10	<10
Chrysene	9.2 1/	<10	<10	<10	<10	<10	<10	<10	<10
Dibenzofuran	24 1/	<10	<10	<10	<10	<10	<10	<10	<10
Fluoranthene	1500 1/	<10	<10	<10	<10	<10	<10	<10	<10
Fluorene	240 1/	<10	<10	<10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	0.092 1/	<10	<10	<10	<10	<10	<10	<10	<10
Naphthalene	6.5 1/	$\boxed{18}$	<10	<10	<10	<10	<10	<10	<10
Phenanthrene	NS	<10	<10	<10	<10	<10	<10	<10	<10
Pyrene	180 1/	<10	<10	<10	<10	<10	<10	<10	<10

Footnotes on Page 6

TABLE 4-3
Summary of Constituents Detected in Groundwater Samples Collected at SWMUs 13 and 21 and BTF SWMUs in 1998 and 1999
BTF and Sewer RFI Addendum
Sloss Industries Corporation

Chemical Lab Sample ID Sample Date	USEPA MCL	980724-BT-13-GW0001 97687-4 & 97691-3 7/24/98	980727-BT-13-GW0002 97698-2 7/27/98	980724-BT-13-GW0005D 97687-5 7/24/98	980724-BT-13-GW0005S 97687-6 7/24/98	981103-BT-13-GW0005S 101195-1 11/3/98	981103-BT-13-GW9005S 101195-5 11/3/98	980724-BT-13-GW0007 97687-9 7/24/98	980725-BT-13-GW0008 97658-4 & 97682-1 7/25/98
Organochlorine Pesticides (ug/L):		ND	NA	NA	NA	NA	NA	NA	ND
Organophosphorous Pesticides (ug/L):		ND	NA	NA	NA	NA	NA	NA	ND
Polychlorinated Biphenyls (ug/L):		ND	NA	NA	NA	NA	NA	NA	ND
Chlorinated Herbicides (ug/L):		ND	NA	NA	NA	NA	NA	NA	ND
Dioxins and Furans (ng/L):		ND	NA	NA	NA	NA	NA	NA	ND
Metals (mg/L):									
Arsenic, Total	0.05	<0.01	<0.01	<0.01	<0.01	NA	NA	<0.01	<0.01
Barium, Total	2	0.22	0.13	0.07	0.13	NA	NA	0.09	0.11
Chromium, Total	0.1	<0.01	<0.01	<0.01	<0.01	NA	NA	<0.01	<0.01
Copper, Total	1.3	<0.02	<0.02	<0.02	<0.02	NA	NA	<0.02	<0.02
Lead, Total	0.015	<0.015	<0.015	<0.015	<0.015	NA	NA	<0.015	<0.015
Mercury, Total	0.002	<0.0005	<0.0005	<0.0005	<0.0005	NA	NA	<0.0005	<0.0005
Zinc, Total	5	0.03	0.07	0.03	0.14	NA	NA	0.17	0.11 J
Sulfide, Total (mg/L):	NS	0.6	NA	NA	NA	NA	NA	NA	13
Cyanide, Total (mg/L):	0.2	0.04 J	0.02	0.06	0.15 J	NA	NA	0.04	0.32 J

Footnotes on Page 6

TABLE 4-3
Summary of Constituents Detected in Groundwater Samples Collected at SWMUs 13 and 21 and BTF SWMUs in 1998 and 1999
BTF and Sewer RFI Addendum
Sloss Industries Corporation

Chemical	USEPA MCL	980725-BT-13-GW9008	980727-BT-13-GW0009	980728-BT-13-GW0010	980727-BT-13-GW0011	980727-BT-13-GW0012	990621-BT-13-GW0038	990621-BT-13-GW0039	990618-BT-13-GW0040
Lab Sample ID		97658-7 & 97682-4	97698-5	97750-2 & 97774	97698-11	97698-8 & 97751	109428-2	109428-3	109390-1
Sample Date		7/25/98	7/27/98	7/28/98	7/27/98	7/27/98	6/21/99	6/21/99	6/18/99
Volatile Organic Compounds (ug/L):									
Benzene	5	5 UJ	<5	340	<5	<5	12	<5	16
Carbon disulfide	1000 1/	<5	<5	<5	<5	<5	6	<5	<5
Chlorobenzene	100	<5	<5	29	<5	<5	<5	<5	19
Toluene	1000	5 UJ	<2	180	<2	<2	2	<2	12
Xylenes	10000	<5	<5	6	<5	<5	14	<5	<5
Semivolatile Organic Compounds (ug/L):									
1,2,4-Trichlorobenzene	70	<10	<10	<10	<10	<10	<10	<10	12
2-Methylnaphthalene	120 1/	<10	<10	<10	<10	<10	16	<10	15
Acenaphthene	370 1/	<10	<10	<10	<10	<10	<10	<10	15
Anthracene	1800 1/	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(a)anthracene	0.092 1/	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(a)pyrene	0.2	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	0.092 1/	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	NS	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	0.92 1/	<10	<10	<10	<10	<10	<10	<10	<10
Bis(2-ethylhexyl)phthalate	6	<10	<10	<10	<10	110	<10	<10	<10
Chrysene	9.2 1/	<10	<10	<10	<10	<10	<10	<10	<10
Dibenzofuran	24 1/	<10	<10	<10	<10	<10	<10	<10	<10
Fluoranthene	1500 1/	<10	<10	<10	<10	<10	<10	<10	11
Fluorene	240 1/	<10	<10	<10	<10	<10	<10	<10	10
Indeno(1,2,3-cd)pyrene	0.092 1/	<10	<10	<10	<10	<10	<10	<10	<10
Naphthalene	6.5 1/	<10	<10	11	<10	<10	420	17	98
Phenanthrene	NS	<10	<10	<10	<10	<10	<10	<10	23
Pyrene	180 1/	<10	<10	<10	<10	<10	<10	<10	<10

Footnotes on Page 6

TABLE 4-3
Summary of Constituents Detected in Groundwater Samples Collected at SWMUs 13 and 21 and BTF SWMUs in 1998 and 1999
BTF and Sewer RFI Addendum
Sloss Industries Corporation

Chemical Lab Sample ID Sample Date	USEPA MCL	980725-BT-13-GW9008 97658-7 & 97682-4 7/25/98	980727-BT-13-GW0009 97698-5 7/27/98	980728-BT-13-GW0010 97750-2 & 97774 7/28/98	980727-BT-13-GW0011 97698-11 7/27/98	980727-BT-13-GW0012 97698-8 & 97751 7/27/98	990621-BT-13-GW0038 109428-2 6/21/99	990621-BT-13-GW0039 109428-3 6/21/99	990618-BT-13-GW0040 109390-1 6/18/99
Organochlorine Pesticides (ug/L):		ND	NA	ND	NA	ND	NA	NA	NA
Organophosphorous Pesticides (ug/L):		ND	NA	ND	NA	ND	NA	NA	NA
Polychlorinated Biphenyls (ug/L):		ND	NA	ND	NA	ND	NA	NA	NA
Chlorinated Herbicides (ug/L):		ND	NA	ND	NA	ND	NA	NA	NA
Dioxins and Furans (ng/L):		ND	NA	ND	NA	ND	NA	NA	NA
Metals (mg/L):									
Arsenic, Total	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Barium, Total	2	0.12	0.02	0.18	0.08	0.1	0.22	0.2	0.09
Chromium, Total	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01
Copper, Total	1.3	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02
Lead, Total	0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	$\boxed{0.02}$	<0.015
Mercury, Total	0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Zinc, Total	5	0.06 J	0.04	0.04	0.03	0.06	0.32 U	0.24 U	0.09 U
Sulfide, Total (mg/L):	NS	19	NA	<0.3	NA	0.4	NA	NA	NA
Cyanide, Total (mg/L):	0.2	0.11 J	$\boxed{0.32}$	<0.02	<0.02	0.07	0.06	<0.02	<0.02

Footnotes on Page 6

TABLE 4-3
Summary of Constituents Detected in Groundwater Samples Collected at SWMUs 13 and 21 and BTF SWMUs in 1998 and 1999
BTF and Sewer RFI Addendum
Sloss Industries Corporation

Chemical	USEPA MCL	990617-BT-13-GW0041	990617-BT-13-GW9041	990617-BT-13-GW0042	990617-BT-13-GW0043	990621-BT-13-GW0044
Lab Sample ID		109373-1	109373-4	109373-2	109373-3	109428-1
Sample Date		6/17/99	6/17/99	6/17/99	6/17/99	6/21/99
Volatile Organic Compounds (ug/L):						
Benzene	5	<5	6	<5	<5	<5
Carbon disulfide	1000 1/	<5	<5	<5	<5	<5
Chlorobenzene	100	<5	<5	<5	<5	<5
Toluene	1000	<2	<2	<2	<2	<2
Xylenes	10000	<5	<5	<5	<5	<5
Semivolatile Organic Compounds (ug/L):						
1,2,4-Trichlorobenzene	70	<10	<10	<10	<10	<10
2-Methylnaphthalene	120 1/	33	29	<10	<10	<10
Acenaphthene	370 1/	39	36	<10	<10	<10
Anthracene	1800 1/	25	25	<10	<10	<10
Benzo(a)anthracene	0.092 1/	23	23	<10	<10	<10
Benzo(a)pyrene	0.2	29	28	<10	<10	<10
Benzo(b)fluoranthene	0.092 1/	23	23	<10	<10	<10
Benzo(g,h,i)perylene	NS	13	14	<10	<10	<10
Benzo(k)fluoranthene	0.92 1/	21	29	<10	<10	<10
Bis(2-ethylhexyl)phthalate	6	<10	<10	<10	<10	<10
Chrysene	9.2 1/	26	25	<10	<10	<10
Dibenzofuran	24 1/	17	16	<10	<10	<10
Fluoranthene	1500 1/	140	140	<10	<10	<10
Fluorene	240 1/	31	30	<10	<10	<10
Indeno(1,2,3-cd)pyrene	0.092 1/	15	14	<10	<10	<10
Naphthalene	6.5 1/	84 J	65 J	<10	<10	<10
Phenanthrene	NS	120	120	<10	<10	<10
Pyrene	180 1/	69	73	<10	<10	<10

Footnotes on Page 6

TABLE 4-3
Summary of Constituents Detected in Groundwater Samples Collected at SWMUs 13 and 21 and BTF SWMUs in 1998 and 1999
BTF and Sewer RFI Addendum
Sloss Industries Corporation

Chemical	USEPA MCL	990617-BT-13-GW0041	990617-BT-13-GW9041	990617-BT-13-GW0042	990617-BT-13-GW0043	990621-BT-13-GW0044
Lab Sample ID		109373-1	109373-4	109373-2	109373-3	109428-1
Sample Date		6/17/99	6/17/99	6/17/99	6/17/99	6/21/99
Organochlorine Pesticides (ug/L):		NA	NA	NA	NA	NA
Organophosphorous Pesticides (ug/L):		NA	NA	NA	NA	NA
Polychlorinated Biphenyls (ug/L):		NA	NA	NA	NA	NA
Chlorinated Herbicides (ug/L):		NA	NA	NA	NA	NA
Dioxins and Furans (ng/L):		NA	NA	NA	NA	NA
Metals (mg/L):						
Arsenic, Total	0.05	<0.01	<0.01	0.01	0.01	<0.01
Barium, Total	2	0.2	0.19	0.22	0.12	0.22
Chromium, Total	0.1	<0.01	<0.01	<0.01	<0.01	<0.01
Copper, Total	1.3	0.02	<0.02	0.02	<0.02	<0.02
Lead, Total	0.015	0.028	0.023	<0.015	<0.015	<0.015
Mercury, Total	0.002	0.002	0.001	<0.0005	<0.0005	<0.0005
Zinc, Total	5	0.17 U	0.12 U	0.1 U	0.07 U	0.07 U
Sulfide, Total (mg/L):	NS	NA	NA	NA	NA	NA
Cyanide, Total (mg/L):	0.2	0.26	0.25	0.12	<0.02	0.04

Explanation:
ug/L - Micrograms per liter.
mg/L - Milligrams per liter.
MCL - Primary Maximum Contaminant Level.
1/ - USEPA Region III Risk Based Concentrations for Tap Water, April 15, 1999.
[box] Concentration exceeds USEPA MCL and USEPA Tap Water RBC.
NS - No Standard.

59

APPENDIX A

Field Logs

APPENDIX A.1

Monitor Well Sample/Core Logs

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG

Boring/Well: mw - 38 | Project/No.: Sloss Industries/ TF000320.0016 Task 0000 11 | Page 1 of 2

Site Location: BTF Area Birmingham, Alabama | Drilling Started: 6/8/99 | Drilling Completed: 6/8/99

Total Depth Drilled: ______ feet | Hole Diameter: 6 3/4" / 6" inches | 6/9/99 (1300) Type of Sample/Coring Device: Split Spoon 6/9/99 (1345)

Length and Diameter of Coring Device: 2' x 2" | Sampling Interval: Continuous feet

9/23/99 Land Surface Elev.: ~534.61 feet | ☐ Surveyed | ☒ Estimated | Datum: ~msl

Drilling Fluid Used: None | Drilling Method: Hollow Stem Auger / Air Rotary / Air Hammer

Drilling Contractor: Graves Service Company | Driller: Ron / John | Helper: ~~Josh~~ AS Lane / Shane / Alton / Mark

Prepared by: AS / JK | Hammer Weight: 140 lb | Hammer Drop: 30 inches

VM (ppm)	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
	0	2	Augered		Asphalt / road bed material. Bottom 6" was red, brown clay, no odor
0	2	4	6"	8/7/7/7	CLAY, mottled moderate reddish brown (10R 4/6), some gravel, some sand, cohesive, dry, stiff, no odor. CL
0	4	6	7"	7/10/15/20	CLAY, dark yellowish orange (10YR 6/6) and light brown (5YR 5/6), little gravel, little sand, cohesive, moist, stiff, no odor. CL
0	6	8	24"	10/13/15/15	CLAY, little gravel, little sand, mottled moderate reddish brown (10R 4/6) to dark yellowish orange (10YR 6/6), cohesive, stiff, dry, no odor. CL.
0	8	10	~~24~~ AS 12"	~~10/13/15/15~~ AS 6/4/6/8	CLAY, moderate reddish brown (10R 4/6) to dark yellowish orange (10YR 6/6), some gravel, little sand, cohesive, moist, stiff, no odor. CL
0	10	12	3"	9/12/16/17	CLAY, mottled dark yellowish orange (10YR 6/6), little gravel, little sand, cohesive, moist, stiff, no odor. CL
0	12	14	12"	1/6/8/7	CLAY, light brown (5YR 6/6) to dark yellowish orange (10YR 6/6), little gravel, trace sand, cohesive, stiff, moist, no odor. CL
0	14	16	22"	7/10/12/15	CLAY mottled dark yellowish orange (10YR 6/6) to light brown (5YR 6/6), some gravel, little sand, cohesive,

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG (cont.d)

…ing/Well: MW-38

Prepared by: AS|JK

	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
					moist, no odor, Stiff. CL
2	16	18	24"	12/10/7/6	CLAY, mottled light brown (5YR 5/6) to dark yellowish orange
					(10YR 6/6), little gravel, little sand, cohesive, moist,
					no odor, gray sandy clay in middle, near bottom-
					organic, black, ~~stained~~ AS material w/ odor. CL
3	18	20	20"	2/5/6/50/0"	CLAY, light brown (5YR 5/6) to black/organic/
				Spoon	~~stained~~ AS/odor material at bottom 1/3 of spoon, cohesive,
				Refusal	moist, little gravel, little sand, no odor at top
				+	2/3. CL
				Auger	Switched to Air Rotary/Air Hammer Drilling for Rock
				Refusal	
	0	21.0	Air Rotary		Redrilled borehole (next to augered hole) w/air rotary
					CLAY, reddish brown, dry. CL
	21.0	23.0	Air Hammer		LIMESTONE, medium gray (N5), dry, medium hard ~~CL~~
	23.0	25.75			LIMESTONE, medium gray (N5) dry, soft. ~~CL~~ KP 10/29
	25.75	30.0			LIMESTONE, medium gray (N5), dry, hard. ~~CL~~
					hit water zone @ ~~2?~~ 25', Gray mud and water
					comming up - small amount.
					(Driller says water was @ 23'-25' in soft L.S. zone)
					6/9/99

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG

Coring/Well mw-39 Project/No. Sloss Industries/ TF000320.0016 Task 0000 11 Page 1 of 2

Site Location BTF Area, Birmingham, Alabama Drilling Started 6/7/99 Drilling Completed 6/7/99

Total Depth Drilled ~~22~~ 16.5 feet Hole Diameter 6 3/4" / 6" inches 6/9/99 (0850) Type of Sample/ Coring Device Split Spoon 6/9/99 (0945)

Length and Diameter of Coring Device 2' x 2" Sampling Interval Continuous feet

Land Surface Elev. 534.45 feet [✓] Surveyed [X] Estimated Datum msl 9/23/99

Drilling Fluid Used None Drilling Method Hollow Stem Auger Air Rotary / Air Hammer

Drilling Contractor Graves Service Company Driller Ron John Helper Josh/Lan Alton

Prepared by AS/JK AARON STEARNS/JASON KIRKPATRICK Hammer Weight 140 lb Hammer Drop 30 inches

VM (ppm)	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
)	0	2	18"	6, 8, 11, 12	CLAY, little gravel, little sand, moderate reddish brown 10R 6/6 + dark yellowish orange zones (10YR 6/6), cohesive, stiff, moist, no odor. Top 4" - road fill. CL
2	2	4	16"	8, 9, 10, 13	CLAY, As some ~~little~~ gravel, some sand, mottled moderate reddish brown (10R 6/6) + dark yellowish orange (10YR 6/6), cohesive, stiff, moist, no odor. CL
0	6 ↓	8 ↓	20"	4/4/6/11	CLAY, some gravel, little sand, mottled moderate reddish brown (10R 6/6) + dark yellowish orange (10YR 6/6), cohesive, stiff, moist, no odor, - organic material found in sample. CL
3	8	10	7"	11/12/14/20	CLAY, mottled dark yellowish orange (10YR 6/6) w/ light grey + moderate reddish brown zones, cohesive, trace sand, cohesive, stiff, moist, no odor. CL
)	10	12	5"	6/9/9/13	CLAY, mottled moderate reddish brown (10R 6/6) and dark yellowish orange (10YR 6/6), cohesive, little gravel, trace sand, cohesive, stiff, moist, no odor. CL
2	12	14	16"	10/9/6/6	CLAY, mottled moderate reddish brown (10R 6/6) + dark yellowish orange (10YR 6/6), trace sand, cohesive, medium stiff, moist, no odor. CL
0	14	16	12"	4/4/4/5	CLAY, mottled moderate reddish brown (10R 6/6) + dark yellowish orange (10YR 6/6), little sand, trace gravel, AS cohesive,

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG (cont.d)

Boring/Well MW-39 Page 2 of 2

Prepared by AS|JK

PID (ppm)	Sample/Core Depth (feet below land surface) From	To	Core Recovery ~~(feet)~~	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
					cohesive, medium stiff, moist, no odor. CL
3	16	18	19"	1/2/4/8	CLAY, moderate reddish brown (10R 4/6) and dark yellowish orange (10YR 6/6), little sand, little gravel, cohesive, medium stiff, moist, no odor. CL
10	18	20	24"	10/9/10/12	CLAY, cohesive, medium stiff, moist, no odor, moderate reddish brown (10R 4/6), little sand, trace gravel - more gravel towards bottom of spoon. CL
0	20	22	10"	1/2/2/3	CLAY, moderate yellowish brown (10YR 5/4) and light brown 5 YR (5/6), little sand, little gravel, medium stiff, cohesive, moist, no odor. CL
0	22	24	24"	3/1/6/17 Auger Refusal @24' BLS	CLAY, dark yellowish orange (10YR 6/6), little gravel, little sand, bottom 3" olive gray sandy clay, cohesive, damp, soft, no odor. CH
	0	23.25	Air Rotary (6")		CLAY, moderate reddish brown (as above) reamed 6" hole w/ air rotary bit to clean out auger boring. 10/28/99
	23.25	24.5	Air Hammer		LIMESTONE, hard, medium gray (N5). ~~CL~~ RT
	24.5	29.5		(6")	LIMESTONE, ~~hard~~ weak RT, medium hard to soft, ~~CH~~ RT medium gray color (N5)
	29.5	33.0			LIMESTONE, hard, medium gray (N5), no odor or staining on rock frag. No significant water noted between 23-33 ft. ~~CL~~ RT 10/28/99

6/9/99

PROJ\FORMS\FIELD\SAMPCORLG2

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG

Boring/Well: mw-40 | Project/No.: Sloss Industries/ TF000320.0016 Task 0000 ~~2~~ 11 | Page 1 of 1

Site Location: Birmingham, Alabama | Drilling Started: 6/7/99 | Drilling Completed: 6/8/99

Total Depth Drilled: ~~18~~ 22.8 feet | Hole Diameter: 6 3/4" / 6" inches | Type of Sample/ Coring Device: Split Spoon

Length and Diameter of Coring Device: 2' x 2" | Sampling Interval: Continuous feet

Land Surface Elev.: 535.04 feet (5 9/23/99) | Surveyed: ✓ | Estimated: ~~X~~ | Datum: msl.

Drilling Fluid Used: None | Drilling Method: Hollow Stem Auger Air Rotary / Air Hammer

Drilling Contractor: Graves Service Company | Driller: Ron | Helper: Josh

Prepared by: Aaron Stearns | Hammer Weight: John 140 lb | Hammer Drop: Alton 30 inches

	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
?m	0	2	Post hole		CLAY, trace sand, some gravel, 5 YR 5/6 - light brown, cohesive, medium stiff, moist, no odor. CL
4	2	4	Posthole		Clay, trace sand, some gravel (limestone), moderate reddish brown (10 R 4/6), cohesive, medium stiff, moist, no odor. CL
7	4	6	19 in.	2/2/3/4	CLAY, trace sand, trace/little gravel, moderate reddish brown (10R 4/6), cohesive, soft, moist, no odor. CH
6	6	8	24 in.	7/7/9/14	CLAY, trace sand, trace gravel, moderate reddish brown (10R 4/6, 6-7 ft.), dark yellowish orange (10YR 6/6, 7-8 ft.) (mottled appearance), cohesive, medium stiff, moist, no odor. CL
3	8	10	17 in.	2/2/7/9	CLAY, trace sand, trace gravel, dark yellowish orange (10YR 6/6) (mottled appearance), cohesive, stiff, moist, no odor. CL
7	10	12	3 in.	7/9/13/7	CLAY, trace sand, trace gravel, dark yellowish orange (10YR 6/6), cohesive, stiff, moist, no odor. CL
5	12	14	17 in.	2/2/3/5	CLAY, little sand, trace (limestone) gravel, light brown (5YR 5/6, mottled appearance), cohesive, stiff, dry, no odor. CL
)	14	16	20 in	10/13/13/12	CLAY, little sand, little gravel, moderate reddish brown (10 R 4/6), cohesive, medium stiff, moist, no odor. CL
)	16	18	24 in	11/13/14/15	CLAY, little sand, little gravel, moderate reddish brown w/ light grey streaks (10 R 4/6), cohesive, soft (16-17 ft.) stiff (17-18 ft.), damp to moist, no odor. CH

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG (cont.d)

ing/Well Mw-40

Prepared by AS/JC

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
18	20	4"	50 blows/2"	CLAY, trace sand, trace gravel, dark
			Spoon Refusal	greenish gray (5Y 4/1), cohesive, soft to
				medium stiff, moist, no odor, gray lime-
				stone in tip of spoon. CH-CL
	Begin	Air Rotary/Air Hammer Drilling		
0	18.25'	Air Rotary		Clay, moderate reddish brown, wet ~~at~~ bottom
18.25'	20.75'	AIR HAMMER		LIMESTONE, soft, (weathered & broken) - no
				consistent hammer chatter. ~~CH~~ KT 10/28/99
20.75	26.5			LIMESTONE, dark to medium gray, hard. ~~CL~~ KT
26.5	27.0			LIMESTONE, medium gray (N5), soft. ~~CH~~ KT
27.0	29.8			LIMESTONE, medium gray (N5), hard. ~~CL~~ KT 10/28/99

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG

Boring/Well: MW-41
Project/No.: Sloss Industries/ TF000320.0016 Task ~~0006~~ 11
Page 1 of 1

Site Location: Birmingham, Alabama
Drilling Started: 6/ ~~8~~ 6/10/99 /99
Drilling Completed: 6/ ~~8~~ 6/10/99 /99

Total Depth Drilled: 16 feet
Hole Diameter: 3" / 6" inches
Type of Sample/ Coring Device: ~~Split Spoon~~ Hand Auger

Length and Diameter of Coring Device: ~~2'x2"~~
Sampling Interval: Continuous feet

Land Surface Elev.: 528.21 feet ☒ Surveyed ☐ Estimated Datum: msl 9/23/99

Drilling Fluid Used: None
Drilling Method: Hand Auger/Air Rotary

Drilling Contractor: Graves Service Company
Driller: Ron/John
Helper: Lane/Shane Allen/Blank

Prepared by: AS/KT JASON KIRKPATRICK
Hammer Weight: ~~140 lb~~
Hammer Drop: ~~30~~ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	2	Hand Auger		GRAVEL (ballast) and fill material, dark brown to black sandy CLAY w/ gravel. Could not get auger past ~1 ft bls.
1	5.0	Air Rotary (6")		GRAVEL (ballast) and sandy CLAY, dark brown to black (5YR 2/2) to (N1), seems loose due to gravel, slight odor, moist to damp. ~~CH~~ KT
5.0	8.25			SAND and GRAVEL w/ Clay, black (N1) sticky mixture w/ strong odor, shiny black, oozy, wet to saturated. Gravel may be fall in from above. Est. 50% CLAY content. ~~CH~~ KT
8.25	8.5			LIMESTONE, gray, hard, solid, trace calcite.
8.5	9.5			LIMESTONE, Gray (N5), broken up, med. hard, trace calcite. ~~CL~~ KT
9.5	12.75			LIMESTONE (?), tan, soft ~~CL~~ KT
12.75	16.0			LIMESTONE, med. gray, (N5), hard, solid, trace calcite. ~~CL~~ KT 10/28/99
		16.0 TOTAL DEPTH		

Jason Kirkpatrick

PROJ\FORMS\FIELD\SAMPCORLG

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG

Boring/Well MW-42 Project/No. Sloss Industries/ TF000320.0016 Task 0000 11 Page 1 of 1

Site Location BTF Area, Birmingham, Alabama Drilling Started 6/8/99 6/11/99 Drilling Completed 6/8/99 6/11/99

Total Depth Drilled 16 feet Hole Diameter 3" / 6" inches Type of Sample/ Coring Device ~~Split Spoon~~ Hand Auger

Length and Diameter of Coring Device ~~2' x 2"~~ Sampling Interval Continuous feet

9/23/99 Land Surface Elev. 528.78 feet [X] Surveyed [ ] Estimated Datum msl

Drilling Fluid Used None Drilling Method Hand auger / Air Rotary

Drilling Contractor Graves Service Company Driller Ron / John Helper Shane / Lane Alton / Man

Prepared by Jason Kirkpatrick Hammer Weight ~~140 lb~~ Hammer Drop ~~30~~ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	1.5	Hand Auger (3")		GRAVEL (ballast) and fill material, sand and clay w/ litter, dark brown, no odor dry, no staining. ~~SC~~ KT 10/28/99
1.5	4.0	Air Rotary (6")		SAND, w/ gravel and silt, dark yellowish brown (10 YR 4/2), non-cohesive, loose, dry, no odor. ~~SC~~ KT 10/28/99
4.0	6.5			~~Limes~~ SAND and broken Limestone chunks (not ballast), black (N1) to dark brown (5YR 3/4) non-cohesive, loose, no odor, no staining, dry. ~~SC~~ KT
6.5	7.0			LIMESTONE, broken up, medium gray (N5) soft. ~~SC~~ KT 10/28/99
7.0	8.0			LIMESTONE, gray (N5), solid, hard. ~~SC~~ KT
8.0	9.5			LIMESTONE, gray (N5), medium ~~soft~~ hard. SC
9.5	10.5			LIMESTONE, medium gray, ~~hard~~ med. soft. SC
10.5	16.0			LIMESTONE, medium gray (N5), hard. ~~SC~~ KT slight water @ 11.2 ft bls. (cut dust), trace calcite. SC

Jason 6/11/99

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG

Boring/Well MW - 43 Project/No. Sloss Industries/ TF000320.0016 Task 0001 Page 1 of 2

Site Location Birmingham, Alabama Drilling Started 6/8/99 6/10/99 1130 Drilling Completed 6/8/99 6/10/99 1150

Total Depth Drilled ~~10~~ 22 feet Hole Diameter 6 3/4" / 6" inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device 2' x 2" Sampling Interval Continuous feet

Land Surface Elev. 529.54 feet [X] Surveyed [ ] Estimated Datum msl (S 9/23/99)

Drilling Fluid Used None Drilling Method Hollow Stem Auger Air Rotary/Air Hammer

Drilling Contractor Graves Service Company Driller Ron John Helper Lane/Shane Alton/Gary

Prepared by AS/JK Hammer Weight 140 lb Hammer Drop 30 inches

VM (ppm)	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	0	2	20"	6/5/7/8	CLAY, FILL MATERIAL w/ sand and gravel, moderate reddish brown, cohesive, moist, no odor, stiff. CL
0	2	4	16"	4/2/2/2	CLAY, FILL MATERIAL, little sand, little gravel, light brown (5YR 5/6), cohesive, stiff, moist, no odor. C
0	4	6	0"	—	No Recovery.
0	6	8	3"	1/0/1/0	CLAY w/ gravel and sand, medium dark gray, cohesive, wet, very soft, no odor. High sand and gravel concentration. CH
0	8	10	15"	1/1/2/4	CLAY, dark gray, little silt, cohesive, thin layer of gravel near top, organic material, no odor, soft, wet. CH
0	10	12	7"	50 blows/1" Spoon Refusal + Auger Refusal	CLAY, ~~Saturated~~ As w/ gravel, sand, medium dark gray saturated, cohesive, no odor, soft, bottom 1" - light. C gray clay w/ limestone fragments. SWITCHED TO AIR RIG TO DRILL INTO ROCK
	Air Rotary (6")			0 - 11.75'	CLAY, reddish brown, as above, lots of water @ ~10'
	11.75	12.25	Air Rotary (6")		LIMESTONE, medium gray, (N5), hard. ~~st~~

PROJ\FORMS\FIELD\SAMPCORLG

KT 10/28/99

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG (cont.d)

Boring/Well MW - 43

Prepared by AS|JK

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
12.25	16.50	Air Rotary		LIMESTONE, fractured + broken up, medium gray (N5), lots of water. ~~CH~~ KA 10/28/99.
16.50	18.00			LIMESTONE, medium gray (N5) still fractured but less so, hard. ~~CH~~ KA 10/28/99
18.0	19.75			LIMESTONE, hard, medium gray (N5) ~~CH~~ KA
19.75	22.0			LIMESTONE, CLAY + GRAVEL, loose material, limestone rock, shale (black) rock, chert rock (white), rock (red), mixed w/ dark yellowish brown (10 YR 6/6) clay, not much clay. The rock is appears weathered and is generally slightly rounded (except the chert), all gravel size material from 1/4" to 1.5" diameter, lots of water here. ~~CH~~ KA 10/28/99

Jason Kirkpatrick
6/10/99

PROJ\FORMS\FIELD\SAMPCORLG2

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG

Boring/Well: mw-44
Project/No.: Sloss Industries/ TF000320.0016 Task 0000 11
Page 1 of 1

Site Location: Birmingham, Alabama
Drilling Started: 6/8/99 6/12/99 0930
Drilling Completed: 6/8/99 6/12/99 1015 0900

Total Depth Drilled: 38 ~~24~~ feet
Hole Diameter: 6 3/4 / 6" inches
Type of Sample/ Coring Device: Split Spoon

Length and Diameter of Coring Device: 2' x 2"
Sampling Interval: Continuous feet

Land Surface Elev.: 533.92 feet (5/23/99)
[ ] Surveyed [X] Estimated
Datum: ~msl

Drilling Fluid Used: None
Drilling Method: Hollow Stem Auger / Air Rotary/Air Hammer

Drilling Contractor: Graves Service Company
Driller: Ron / John
Helper: Lane/Shane / Alton

Prepared by: AS/JK
Hammer Weight: 140 lb
Hammer Drop: 30 inches

HNu ppm	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0.0 (ND)	0	5	Auger	cuttings	CLAY, moderate reddish brown, little sand/gravel, cohesive, no odor, moist, medium stiff. Dark yellowish orange after 3'. CL
0 (ND)	5	10	Auger	Cuttings	CLAY, trace gravel, little sand, dark yellowish orange (10YR 6/6), cohesive, stiff, moist to dry, no odor. CL
0 (ND)	10	14	Auger	Cuttings	CLAY, trace gravel, trace to little sand, dark yellowish orange (10YR 6/6), cohesive, stiff, moist, no odor. CL
0 (ND)	14	16	24"	3/3/9/10	CLAY, mottled moderate reddish brown (10R 4/6) and light brown (5YR 5/6), cohesive, no odor, little sand, little gravel, medium stiff, moist. CL
0 (ND)	16	18	18"	7/10/14/21	CLAY, mottled moderate reddish brown (10R 4/6) on outside to medium dark gray in middle, trace gravel, little sand, cohesive, medium stiff, no odor, moist. CL
0 (ND)	18	20	10"	4/5/5/10	CLAY, little gravel, little sand, light brown (5YR 5/6) to dark yellowish orange (10YR 6/6) cohesive, moist, medium stiff, no odor. CL
	20	22	–	50 blows/0" Spoon Refusal	Clay, light brown (5YR 5/6), trace sand, trace gravel, damp, cohesive, no odor, soft. CH

PROJ\FORMS\FIELD\SAMPCORLG

ND = non-detect.

ARCADIS
GERAGHTY & MILLER

SAMPLE/CORE LOG (cont.d)

Boring/Well Mw-44

Prepared by J. KIRKPATRICK

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	20	Air Rotary (6")		Switch over to Air Rotary + Air Hammer Drilling for installation of well in upper bedrock zone
20	25	Air Hammer (6")		LIMESTONE, dark gray w/ occasional Calcite vein, hard, dry. ~~CL~~ KK 10/28/99
25	25.75			LIMESTONE, dark gray as above but slightly softer, (much more dusty. ~~CL~~ KK
25.75	29.0			LIMESTONE, medium gray (N5), hard, dry, occasional calcite vein, ~~CL~~ KK 10/28/99
29.0	34.0	STARTED HERE FOR 2ND HOLE Air Hammer		LIMESTONE, medium hard to soft, medium gray (N5) color, trace calcite veins, dry Hit water zone @ ~33.25' bls. - making good water
34	38.25			LIMESTONE, medium gray (N5) w/ calcite veins, hard, dry. ~~CL~~ KK 10/28/99

6/12/99

PROJ\FORMS\FIELD\SAMPCORLG2

APPENDIX A.2

Well Construction Logs

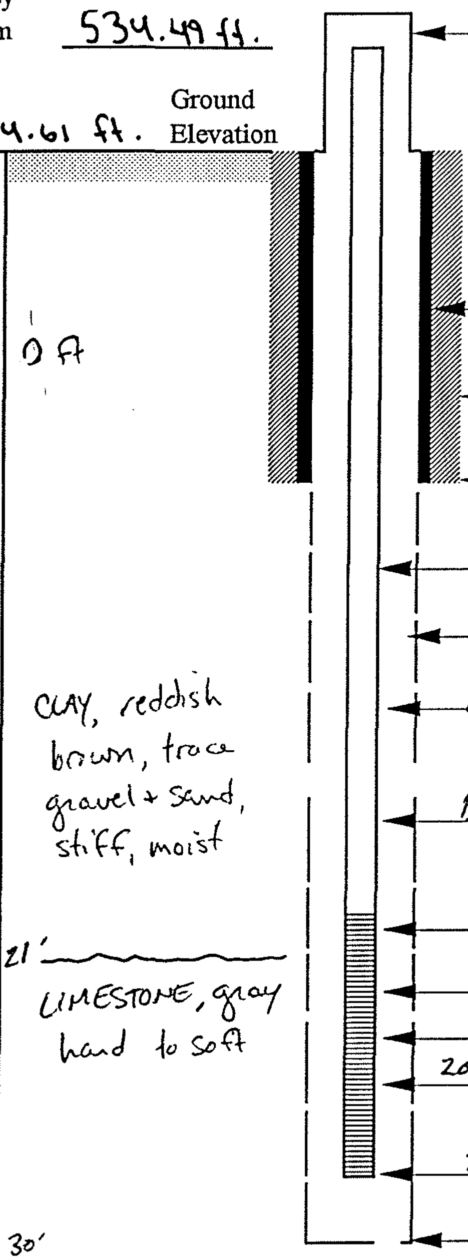
MONITOR WELL REPORT

Client: Sloss Industries   Site Location: Birmingham, Alabama
Well Location: BTF Area
Project No. TF000320.0016   Task 000011
Contractor: Graves Service Company Inc.   Driller(s): John Mitchell
Drilling Method(s): Air Rotary/Air Hammer   Helper(s): Alton/Mark
Prepared By: Jason Kirkpatrick   Date(s) Installed: 6/9/99

Monitor Well No. MW-38
SWMU Area: BTF
SWMU: #13

Survey Datum: AS 9/23/99 534.49 ft.

534.61 ft. Ground Elevation



GENERAL SOIL CONDITIONS (Not to Scale)

0 ft

CLAY, reddish brown, trace gravel + sand, stiff, moist

21'

LIMESTONE, gray hard to soft

30'

Value	Item
	Type of Protective Cover
NONE	ID of Surface Casing / Type of Surface Casing
NA	Diameter of Borehole
NA	Depth Bottom of Surface Casing
SCH 40 PVC	Type of Riser Pipe
6"	Diameter of Borehole
Portland Type I	Type of Grout Around Riser Pipe
14.0	Depth Top of Seal
Bentonite (pellets)	Type of Seal
17.0	Depth Bottom of Seal
19.5'	Depth Top of Screen
SCH 40 PVC	Screen Section Material
0.010" slot	Screen Size
20/30 Silica	Type of Sand Pack Around Screen
29.5'	Depth Bottom of Screen
30'	Depth Bottom of Borehole/Sandpack

REMARKS: Hit water bearing zone in LIMESTONE around 25' bls. No problems w/ well installation.

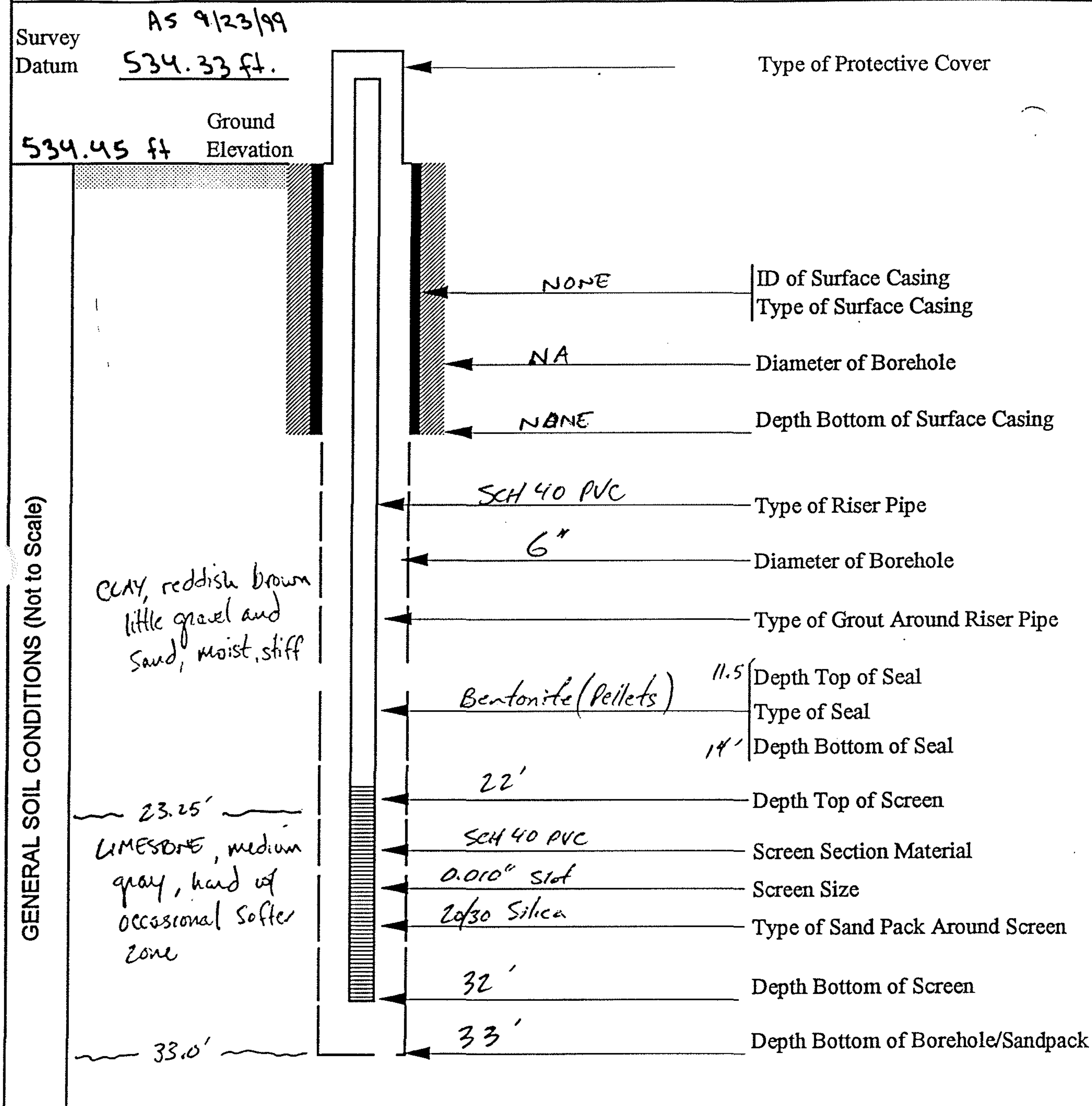
ARCADIS
GERAGHTY & MILLER

g:\proj\tf320\tbl\obswell2.xls

MONITOR WELL REPORT

Client: Sloss Industries | Site Location: Birmingham, Alabama
Well Location: BTF Area - 50' N of MW-5
Project No. TF000320.0016 | Task 000~~0~~11
Contractor: Graves Service Company Inc. | Driller(s): John Mitchell
Drilling Method(s): Air Rotary/Air Hammer | Helper(s): Alton/Mark
Prepared By: Jason Kirkpatrick | Date(s) Installed: 6/9/99

Monitor Well No. MW-39
SWMU Area: BTF
SWMU: #13



REMARKS: Had to flush "fall-in" from borehole (approx. 3') and pump sand into borehole w/ tremmie to displace the fall-in. Worked well but had too much sand. Could not flush sand out.

ARCADIS GERAGHTY & MILLER

g:\proj\tf320\tbl\obswell2.xls

MONITOR WELL REPORT

Client Sloss Industries Site Location Birmingham, Alabama
Well Location BTF Area
Project No. TF000320.00 Task 0000
Contractor Graves Service Company Inc. Driller(s) John Mitchel
Drilling Method(s) Air Rotary Helper(s) Alton
Prepared By Jason Kirkpatrick Date(s) Installed 6/8/99

Monitor Well No. MW-40
SWMU Area BTF
SWMU #13

Survey Datum 537.67 (As 9/23/99)

Ground Elevation 535.04 ft.

Item	Value
Type of Protective Cover	
ID of Surface Casing / Type of Surface Casing	NA
Diameter of Borehole	NA
Depth Bottom of Surface Casing	NONE
Type of Riser Pipe	SCH 40 PVC
Diameter of Borehole	6"
Type of Grout Around Riser Pipe	Portland Type I
Depth Top of Seal	13.5
Type of Seal	Bentonite (pellets)
Depth Bottom of Seal	15.5
Depth Top of Screen	17.5
Screen Section Material	10' x 0.010" slot PVC
Screen Size	10' x 0.010" slot PVC
Type of Sand Pack Around Screen	20/30 Silica
Depth Bottom of Screen	27.5
Depth Bottom of Borehole/Sandpack	27.75

GENERAL SOIL CONDITIONS (Not to Scale)

CLAY, reddish brown to yellowish brown trace gravel + sand moist, stiff

18.25'

LIMESTONE, med. gray, hard w/ occasional soft zone

27.75'

REMARKS:

ARCADIS GERAGHTY & MILLER

g:\proj\tf320\tbl\obswell2.xls

MONITOR WELL REPORT

Client: Sloss Industries | Site Location: Birmingham, Alabama

Well Location:

Project No.: TF000320.0016 | Task: 0006 11

Contractor: Graves Service Company Inc. | Driller(s): John Mitchel

Drilling Method(s): Air Rotary | Helper(s): Alton/ Mark

Prepared By: Jason Kirkpatrick | Date(s) Installed: 6/10/99

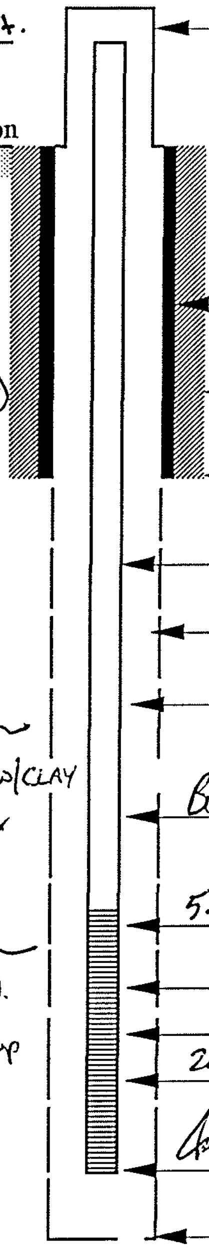
Monitor Well No.: MW-41

SWMU Area: BTF

SWMU: 13

Survey Datum: AS 9/23/99 530.92 ft.

Ground Elevation: 528.21 ft.



GENERAL SOIL CONDITIONS (Not to Scale)

GRAVEL (ballast) + FILL, dark brown, loose.

~ 5.0' ~

SAND + GRAVEL, w/CLAY black, loose, odor

~ 8.25' ~

LIMESTONE, med. gray, broken up near top then hard, solid.

Item	Entry
Type of Protective Cover	
ID of Surface Casing / Type of Surface Casing	None
Diameter of Borehole	NA
Depth Bottom of Surface Casing	None
Type of Riser Pipe	SCH 40 PVC
Diameter of Borehole	6"
Type of Grout Around Riser Pipe	
Depth Top of Seal	2.0'
Type of Seal	Bentonite (pellets)
Depth Bottom of Seal	3.5'
Depth Top of Screen	5.5' ~~6ft~~
Screen Section Material	SCH 40 PVC
Screen Size	0.010" SLOT
Type of Sand Pack Around Screen	20/30 SILICA
Depth Bottom of Screen	~~[illegible]~~ 15.5'
Depth Bottom of Borehole/Sandpack	16'

REMARKS:

ARCADIS GERAGHTY & MILLER

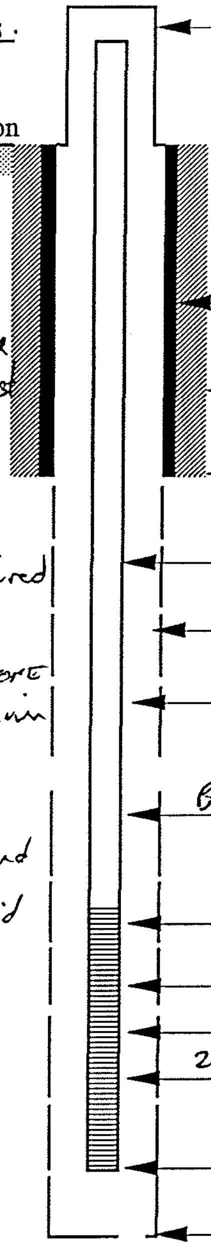
g:\proj\tf320\tbl\obswell2.xls

MONITOR WELL REPORT

Client	Sloss Industries
Site Location	Birmingham, Alabama
Well Location	BTF Area
Project No.	TF000320.0016
Task	0000/11
Contractor	Graves Service Company Inc.
Driller(s)	John Mitchell
Drilling Method(s)	Air Rotary
Helper(s)	Alton / Mark
Prepared By	Jason Kirkpatrick
Date(s) Installed	6/11/99
Monitor Well No.	MW-42
SWMU Area	BTF
SWMU	#13

Survey Datum: As 9/23/99 530.81 ft.

528.78 ft Ground Elevation



GENERAL SOIL CONDITIONS (Not to Scale)

0-6.5' Fill + Sandy clay, loose w/ gravel ballast

6.5-7.0 LIMESTONE, fractured soft

7.0-10.0 LIMESTONE alternating medium to soft zones.

10.0-16.0 LIMESTONE, hard gray (NS) solid trace calcite

Type of Protective Cover	
ID of Surface Casing / Type of Surface Casing	NONE
Diameter of Borehole	NA
Depth Bottom of Surface Casing	NONE
Type of Riser Pipe	SCH 40 PVC
Diameter of Borehole	6"
Type of Grout Around Riser Pipe	Portland Type I
Depth Top of Seal	2.5'
Type of Seal	Bentonite (pellets)
Depth Bottom of Seal	3.5'
Depth Top of Screen	5.5'
Screen Section Material	SCH 40 PVC
Screen Size	0.010" Slot
Type of Sand Pack Around Screen	20/30 Silica
Depth Bottom of Screen	15.5
Depth Bottom of Borehole/Sandpack	16.0

REMARKS: Hit very slight water zone @ 11.2 ft bls. Otherwise a dry hole.

ARCADIS GERAGHTY & MILLER

g:\proj\tf320\tbl\obswell2.xl5

MONITOR WELL REPORT

Client	Sloss Industries	Site Location	Birmingham, Alabama
Well Location			
Project No.	TF000320.0016	Task 0000 11	
Contractor	Graves Service Company Inc.	Driller(s)	John Mitchel
Drilling Method(s)	Air Rotary	Helper(s)	Alton / Mark
Prepared By	Jason Kirkpatrick	Date(s) Installed	6/10/99

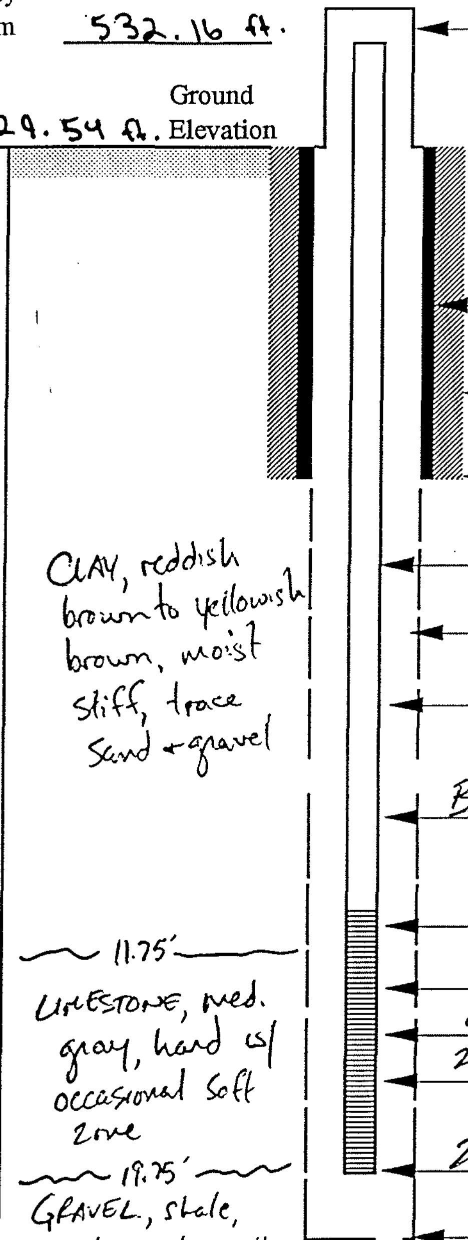
Monitor Well No. MW-43

SWMU Area BTF

SWMU #13

Survey Datum AS 9/23/99 532.16 ft.

529.54 ft. Ground Elevation



Type of Protective Cover

NONE — ID of Surface Casing / Type of Surface Casing

NA — Diameter of Borehole

NONE — Depth Bottom of Surface Casing

SCH 40 PVC — Type of Riser Pipe

6" — Diameter of Borehole

Type of Grout Around Riser Pipe

6.4' — Depth Top of Seal

Bentonite Pellets — Type of Seal

8.0' — Depth Bottom of Seal

10' — Depth Top of Screen

SCH 40 PVC — Screen Section Material

0.010" slot — Screen Size

20/30 Silica — Type of Sand Pack Around Screen

20' — Depth Bottom of Screen/Sand pack

22' — Depth Bottom of Borehole/~~Sandpack~~ fall-in (gravel)

GENERAL SOIL CONDITIONS (Not to Scale)

CLAY, reddish brown to yellowish brown, moist stiff, trace sand + gravel

11.75'

LIMESTONE, med. gray, hard w/ occasional soft zone

19.75'

GRAVEL, shale, chert, limestone all mixed together w/ sand

REMARKS: A void developed in the overburden (washed out) above the bedrock. Took extra sand (5 bags) and bentonite (3 buckets) to complete well across this void.

ARCADIS GERAGHTY & MILLER

g:\proj\tf320\tbl\obswell2.xls

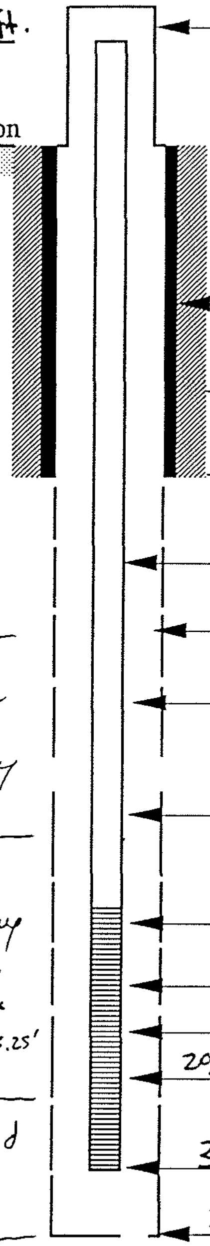
MONITOR WELL REPORT

Client: Sloss Industries
Site Location: Birmingham, Alabama
Well Location:
Project No.: TF000320.0016
Task: 0000 11
Contractor: Graves Service Company Inc.
Driller(s): JOHN MITCHELL
Drilling Method(s): Air Rotary
Helper(s): Alton / Ron
Prepared By: Jason Kirkpatrick
Date(s) Installed: 6/12/99

Monitor Well No.: MW-44
SWMU Area: BTF
SWMU: #13

Survey Datum: As 9/23/99 536.03 ft.

Ground Elevation: 533.92 ft.



Item	Value
Type of Protective Cover	
ID of Surface Casing / Type of Surface Casing	6" STEEL
Diameter of Borehole	10"
Depth Bottom of Surface Casing	22.5
Type of Riser Pipe	SCH 40 PVC
Diameter of Borehole	6"
Type of Grout Around Riser Pipe	Portland Type I
Depth Top of Seal	23.4'
Type of Seal	Bentonite (pellets)
Depth Bottom of Seal	25.5'
Depth Top of Screen	27.75'
Screen Section Material	SCH 40 PVC
Screen Size	0.010" SLOT
Type of Sand Pack Around Screen	20/30 SILICA
Depth Bottom of Screen	37.75'
Depth Bottom of Borehole/Sandpack	38.25'

GENERAL SOIL CONDITIONS (Not to Scale)

CLAY, reddish brown to yellow brown, dry to moist, stiff
— 21.5 —
LIMESTONE, gray, hard w/calcite
— 25.0 —
L.S., soft
— 26.0 —
L.S., hard, gray
— 29.0 —
LIMESTONE, gray w/calcite, medium hard to soft H2O @ 35.25'
— 34' —
LIMESTONE, hard w/calcite

REMARKS: No problems w/ installation

ARCADIS
GERAGHTY & MILLER

APPENDIX A.3

Well Development Logs

ARCADIS
GERAGHTY & MILLER

WELL DEVELOPMENT SUMMARY

Project Name/No.	Sloss Industries	Well:	mw-38
Project No.	TF000320.00 16 Task 000011	SWMU:	#13
Location:	Birmingham, Alabama	Site ID	BTF
Client:	Sloss Industries	Prepared by:	Aaron Stearns

Method/Equipment:

Static DTW 6.25 Pumping DTW ~8.1 (ft below MP)

Pumping Rate 1 ± gpm Pumping Duration: 1 hour

Specific Capacity AS ~~NA~~ .54 gpm/ft

Water Removed During Development 55 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
6/15/99	1315	6.96	1,030	21°c	>100		20
	1328	6.96	1,020	21°c	180		35
	1340	6.97	1,020	21°c	110		45
	1350	6.98	1,020	21°c	57		55

Remarks:

j:\proj\tf320\tbl\btfwldev.xls

ARCADIS
GERAGHTY & MILLER

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries | Well: mw-~~44~~ ~~38~~ 39 AS AS
Project No. TF000320.0016 Task 000~~0~~11 | SWMU: #13
Location: Birmingham, Alabama | Site ID BTF
Client: Sloss Industries | Prepared by: Aaron Stearns

Method/Equipment:

Static DTW ~~10.11~~ 6.25 Pumping DTW 19.0 (ft below MP)

Pumping Rate 1 gpm Pumping Duration: ~~11:15 25 45 minutes~~ AS 1hour

Specific Capacity ~~NA~~ AS .078 gpm/ft

Water Removed During Development 55 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
6/15	1142	6.75	990	23°	>200		17
6/15	1153	6.76	970	23°	112		AS ~~9~~ 26
6/15	1206	6.76	950	23°	91		36
6/15	1216	6.80	940	23°	78		46
6/15	1225	6.80	970	23°	59		55

Remarks:

ARCADIS
GERAGHTY & MILLER

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries
Project No. TF000320.0016 Task 000~~0~~11
Location: Birmingham, Alabama
Client: Sloss Industries

Well: MW-40
SWMU: #13
Site ID BTF
Prepared by: Aaron Stearns

Method/Equipment:

Static DTW 9.27 Pumping DTW Variable (ft below MP)

Pumping Rate 1 gpm gpm Pumping Duration: 9:10 - 10:30 - 6/15 - 13gal

Specific Capacity — gpm/ft 1005 - 1150 - 6/16 - 14g

Water Removed During Development ______ gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
6/15	1030	6.63	1,160	23	~100		13
6/~~18~~ 16	1116	6.44	1230	24°	~200		19.5
AS	1150	6.77	1250	23°	~200		27

Remarks: 6/15 - Pumped well dry ~~the first~~ AS 3 times - 13 gallons total
6/~~18~~ 16 - Pumped well dry after 5 gallons total
6/~~18~~ 16 - Pumped well dry after 1.5 gallons total
AS
6/16 - Pumped well again but water stayed uniform (light brown, silty, turbid) after pumping 8 gallons

ARCADIS
GERAGHTY & MILLER

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries | Well: MW-41
Project No. TF000320.0016 Task 000011 | SWMU: #13
Location: Birmingham, Alabama | Site ID BTF
Client: Sloss Industries | Prepared by: Aaron Stearns

Method/Equipment:

Static DTW 6.45 Pumping DTW 9.0 (ft below MP)

Pumping Rate 1 gpm Pumping Duration: ~~47 minutes~~ AS 1hr.

Specific Capacity .39 gpm/ft

Water Removed During Development 45 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
6/15	1624	7.31	850	22°C	>200		11
	1638	7.39	850	21°C	45		20
	1700	7.57	960	22°C	>200		36
	1711	7.60	1020	22°C	36		45

Remarks: well pumped dry after 25 gallons
well pumped dry after 45 gallons

ARCADIS
GERAGHTY & MILLER

WELL DEVELOPMENT SUMMARY

Project Name/No.	Sloss Industries	Well:	mw-42
Project No.	TF000320.0016 Task 00011	SWMU:	#13
Location:	Birmingham, Alabama	Site ID	BTF
Client:	Sloss Industries	Prepared by:	Aaron Stearns

Method/Equipment:

Static DTW 7.34 Pumping DTW 8.95 (ft below MP)

Pumping Rate 1 gpm Pumping Duration: 0820-0917

Specific Capacity .62 gpm/ft

Water Removed During Development 55. gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
6/16	0840	6.88	820	21	~100		22
	0850	6.97	810	21°	20		32
	0902	6.95	800	21°	4.7		41
	0913	6.96	810	21°	3.25		52

Remarks:

ARCADIS
GERAGHTY & MILLER

WELL DEVELOPMENT SUMMARY

Project Name/No.	Sloss Industries	Well:	MW-43
Project No.	TF000320.0016 Task 0000ll	SWMU:	#13
Location:	Birmingham, Alabama	Site ID	BTF
Client:	Sloss Industries	Prepared by:	Aaron Stearns

Method/Equipment:

Static DTW 8.95 ft btoc Pumping DTW 10.8 (ft below MP)

Pumping Rate ±1 gpm Pumping Duration: 1 hr. + 10 minutes

Specific Capacity ~~NA~~ AS .54 gpm/ft

Water Removed During Development 55 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
6/15/99	1450	7.08	1,030	24°c	>200		15
	1500	7.07	990	24°C	>200		25
	1517	7.04	970	24°c	80		35
	1525	7.09	1000	19°c	>200		45
	1541	7.10	980	19°c	173		55

Remarks: Surged well and raised pump after 35 gallons - turbidity went up.

ARCADIS
GERAGHTY & MILLER

WELL DEVELOPMENT SUMMARY

Project Name/No.	Sloss Industries	Well:	MW-~~38~~ 44
Project No.	TF000320.0016 Task 000~~0~~11	SWMU:	#13
Location:	Birmingham, Alabama	Site ID	BTF
Client:	Sloss Industries	Prepared by:	Aaron Stearns

Method/Equipment:

Static DTW ~~6.25~~ 10.1 Pumping DTW 12.5 (ft below MP)

Pumping Rate 1 gpm Pumping Duration: 1220 - 1320

Specific Capacity .42 gpm/ft

Water Removed During Development 55 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
6/16	1238	7.33	820	23°C	126		15
	1250	7.33	810	23°C	65		26
	1304	7.29	830	22°C	40		39
	1315	AS ~~8.41~~ 7.28	820	23°C	26		50

Remarks:

APPENDIX A.4

Water Level Measurements

ARCADIS
GERAGHTY & MILLER

MULTIPLE WELL MEASUREMENTS

Well No.	Well Depth	Date	Time	DTW	DTP	PROD	RMVD	Remarks
mw-01		6/16/99		8.13				
mw-02				6.05				Bent
mw-03								DNAPL - Nm
mw-04A								DNAPL - Nm
mw-05D				10.82				
mw-05S				7.75				
mw-06								LNAPL - Nm
mw-07				12.07				
mw-08				15.37				
mw-09				10.60				
mw-10				9.00				
mw-11				9.11				
mw-12				8.69				
mw-13D				92.08				
mw-13S				5.25				
mw-16D				16.99				
mw-16S				16.30				
mw-17				25.03				
mw-18				13.89				
mw-19				3.18				
mw-21				14.71				No lock
mw-22				94.01				
mw-23				31.14				
mw-24				13.92				
mw-25D				17.09				
mw-25S				17.78				
mw-26				86.16				
mw-27A				15.38				No lock
mw-28				15.80				
mw-29				19.13				
mw-30D				19.22				
mw-30S				19.73				
mw-31				21.30				No lock

ARCADIS
GERAGHTY & MILLER

MULTIPLE WELL MEASUREMENTS

Well No.	Well Depth	Date	Time	DTW	DTP	PROD	RMVD	Remarks
mw-32		6/16/99		16.87				
mw-33				8.08				
mw-34D				6.04				
mw-34S				6.21				
mw-35				7.43				No lock
mw-36								NM
mw-37				4.38				No lock
mw-38				6.18				
mw-39				6.17				
mw-40				11.42				
mw-41				6.37				
mw-42				7.16				
mw-43				8.58				
mw-44				10.37				
P-03				10.33				
P-08				7.77				
P-09				162.07				
P-10				12.87				
P-11				4.88				
P-12				5.07				
P-13D				74.85				
P-13S				8.87				
P-14				6.54				
P-15				3.53				
P-16A				5.03				
P-17				4.85				
P-18				10.81				
P-19D				4.04				
P-19S				4.26				Pad split in half
P-20				36.06				
P-21				78.50				
P-22				10.71				

ARCADIS
GERAGHTY & MILLER

MULTIPLE WELL MEASUREMENTS

Well No.	Well Depth	Date	Time	DTW	DTP	PROD	RMVD	Remarks
P-23		6/16/99		16.49				
P-32				8.45				
SG-3				13.97				
SG-1A				1.30				
SG-2A								Damaged by drift wood
SG-4				0.90				

APPENDIX A.5

Groundwater Sampling Logs

ARCADIS
GERAGHTY & MILLER

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF000320.00~~0~~16 Task 000~~0~~11 Page 1 of 1

Site Location Birmingham, Alabama Site/Well No. MW- 38

Sample I.D. 990621 - BT-13 - GW0038 Coded/ Replicate No. Date 6 / 21 / 99

Weather Sunny 80's Purge Begin 1150 Purge Ended 1207 Time Collected 1210

EVACUATION DATA

Description of Measuring Point (MP) TOC 10/28/99

Height of MP Above/Below Land Surface	–	MP Elevation	–
Total Sounded Depth of Well Below MP	29.52	Water-Level Elevation	
Depth of Water Below MP	6.18	Diameter of Casing	2"
Water Column in Well	23.34	Total Purge Volume	19 gallons
Gallons per Foot	.16	Sampling Pump Intake	
Gallons in Well	3.73x5 ≈ 19 gallons	(feet below MP)	

Evacuation Method 2" submersible pump

SAMPLING DATA/FIELD PARAMETERS

Sampling Method teflon bailer

Color light yellow Odor no odor Appearance clear Temperature 23 | 23.5 | 22.5 °C

Specific Conductance (umhos/cm) 940 | 910 | 970 pH 6.77 | 6.78 | 6.80 Dissolved Oxygen 1.40 | 1.70 | 1.55 mg/L

Turbidity 9.4 NTUs Eh — mV

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab. X or G&M	Preservative
VOCs (8260B)	3 40-ml vials	HCL
SVOCs (8270C)	2 1-liter amber glass	None
Cyanide (9010)	950 ml plastic	NaOH
PP Metals & Barium (6010, 7060, 7740, 7841)	500 ml HDPE	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Aaron Stearns, Jason Kirkpatrick

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

ARCADIS
GERAGHTY & MILLER

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF000320.0016 Task 000~~0~~11 Page 1 of 1

Site Location Birmingham, Alabama Site/Well No. MW-39

Sample I.D. 99062~~18~~1-BT-13-GW0039 Coded/ Replicate No. Date 6 / ~~18~~ 21 / 99

Weather Sunny 80's Purge Begin 1015 Purge Ended 1043 Time Collected 1045

EVACUATION DATA

Description of Measuring Point (MP) TOC KP 10/28/99

Height of MP Above/Below Land Surface	-	MP Elevation	-
Total Sounded Depth of Well Below MP	32.40	Water-Level Elevation	
Depth of Water Below MP	6.17	Diameter of Casing	2"
Water Column in Well	26.23	Total Purge Volume	21 gallons
Gallons per Foot	.16	Sampling Pump Intake	
Gallons in Well	4.20x5=21 gallons	(feet below MP)	

Evacuation Method 2" submersible pump

SAMPLING DATA/FIELD PARAMETERS

Sampling Method teflon bailer

Color light yellow Odor slight odor Appearance clear Temperature 23.5 | 23.7 | 23.5 °C

Specific Conductance (umhos/cm) 900 | 910 | 920 pH 6.63 | 6.65 | 6.67 Dissolved Oxygen 1.20 | 1.07 | 1.12 mg/L

Turbidity 15.7 NTUs Eh — mV

Other

CONTAINER DESCRIPTION

From Lab X or G&M

Constituents Sampled	Container	Preservative
VOCs (8260B)	3 40-ml vials	HCL
SVOCs (8270C)	2 1-liter amber glass	None
Cyanide (9010)	950 ml plastic	NaOH
PP Metals & Barium (6010, 7060, 7740, 7841)	500 ml HDPE	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks Turbidity increased to >200 NTU's once bailer was installed for sampling.

Sampling Personnel Aaron Steams, Jason Kirkpatrick

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

ARCADIS
GERAGHTY & MILLER

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF000320.0016 Task 0000 11 Page 1 of 1

Site Location Birmingham, Alabama Site/Well No. MW- 40

Sample I.D. 990618-BT-13-GW0040 Coded/ Replicate No. Date 6 / 18 / 99

Weather Sunny 80's Purge Begin 1015 Purge Ended 1045 Time Collected 1315

EVACUATION DATA

Description of Measuring Point (MP) TOC 10/28/98 KB

Height of MP Above/Below Land Surface	–	MP Elevation	–
Total Sounded Depth of Well Below MP	30.30	Water-Level Elevation	
Depth of Water Below MP	11.42	Diameter of Casing	2"
Water Column in Well	18.88	Total Purge Volume	8 gallons
Gallons per Foot	.16	Sampling Pump Intake	
Gallons in Well	3.02x5 = 15.1	(feet below MP)	

Evacuation Method 2" submersible pump

SAMPLING DATA/FIELD PARAMETERS

Sampling Method teflon bailer

Color light brown Odor ∅ odor Appearance turbid Temperature 23° | 23° °C

Specific Conductance (umhos/cm) 1160 | 1100 pH 6.20 | 6.38 Dissolved Oxygen 1.98 | 1.98 mg/L

Turbidity >200 NTUs Eh — mV

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260B)	3 40-ml vials	HCL
SVOCs (8270C)	2 1-liter amber glass	None
Cyanide (9010)	950 ml plastic	NaOH
PP Metals & Barium (6010, 7060, 7740, 7841)	500 ml HDPE	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Aaron Steams, Jason Kirkpatrick

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\0320\wslog1.xls

ARCADIS
GERAGHTY & MILLER

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF000320.00\16 Task 000~~0~~11 Page 1 of 1

Site Location Birmingham, Alabama Site/Well No. MW- 41

Sample I.D. 990617-BT-13-GW0041 Coded/ Replicate No. 990617-BT-13-GW0041 Date 6 / 17 / 99

Weather P/C 80's Purge Begin 1320 Purge Ended 1330 Time Collected 1345

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	—	MP Elevation	—
Total Sounded Depth of Well Below MP	18.65	Water-Level Elevation	
Depth of Water Below MP	6.37	Diameter of Casing	2"
Water Column in Well	AS ~~16~~ 12.28	Total Purge Volume	10 gallons
Gallons per Foot	.16	Sampling Pump Intake	
Gallons in Well	1.96 x 5 = 9.8	(feet below MP)	

Evacuation Method 2" submersible pump

SAMPLING DATA/FIELD PARAMETERS

Sampling Method teflon bailer

Color grey/brown Odor slight odor Appearance slightly turbid Temperature 23/23/ °C

Specific Conductance (umhos/cm) 1010/990/1030 pH 7.35/7.37/7.38 Dissolved Oxygen 1.55/1.46/1.40 mg/L

Turbidity 58.8 NTUs Eh — mV

Other

CONTAINER DESCRIPTION

From Lab X or G&M

Constituents Sampled	Container	Preservative
VOCs (8260B)	3 40-ml vials	HCL
SVOCs (8270C)	2 1-liter amber glass	None
Cyanide (9010)	950 ml plastic	NaOH
PP Metals & Barium (6010, 7060, 7740, 7841)	500 ml HDPE	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks Also took MS/MSD

Sampling Personnel Aaron Steams, Jason Kirkpatrick

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

ARCADIS
GERAGHTY & MILLER

WATER SAMPLING LOG

Project Name/Number: Sloss Industries / TF000320.0016 Task 0001 11 Page 1 of 1

Site Location: Birmingham, Alabama Site/Well No. MW- 42

Sample I.D.: 990617 - BT- 13 - GW0042 Coded/Replicate No. Date 6 / 17 / 99

Weather: P/C 80's Purge Begin 1520 Purge Ended 1532 Time Collected 1540

EVACUATION DATA

Description of Measuring Point (MP): TOC

Height of MP Above/Below Land Surface	–	MP Elevation	–
Total Sounded Depth of Well Below MP	18.21	Water-Level Elevation	–
Depth of Water Below MP	7.16	Diameter of Casing	2"
Water Column in Well	~~16~~ 11.05	Total Purge Volume	11 gallons
Gallons per Foot	.16	Sampling Pump Intake (feet below MP)	
Gallons in Well	1.77 x 5 = 8.85		

Evacuation Method: 2" submersible pump

SAMPLING DATA/FIELD PARAMETERS

Sampling Method: teflon bailer

Color: None Odor: None Appearance: Clear Temperature: 23/23/23 °C

Specific Conductance (umhos/cm): 780/810/780 pH 6.73/6.78/6.79 Dissolved Oxygen 1.80/1.72/1.63 mg/L

Turbidity: 45 NTUs Eh — mV

Other:

CONTAINER DESCRIPTION

From Lab X or G&M

Constituents Sampled	Container	Preservative
VOCs (8260B)	3 40-ml vials	HCL
SVOCs (8270C)	2 1-liter amber glass	None
Cyanide (9010)	950 ml plastic	NaOH
PP Metals & Barium (6010, 7060, 7740, 7841)	500 ml HDPE	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks:

Sampling Personnel: Aaron Steams, Jason Kirkpatrick

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

ARCADIS
GERAGHTY&MILLER

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF000320.00 ~~0~~16 Task 000~~0~~11 Page 1 of 1

Site Location Birmingham, Alabama Site/Well No. MW- 43

Sample I.D. 990617 - BT-13- GW004~~2~~3 AS Coded/Replicate No. Date 6 / 17 / 99

Weather P/C 80's Purge Begin 1150 Purge Ended 1200 Time Collected 1210

EVACUATION DATA

Description of Measuring Point (MP) TOC (KP) 10/28/99

Height of MP Above/Below Land Surface	—	MP Elevation	—
Total Sounded Depth of Well Below MP	23.30	Water-Level Elevation	
Depth of Water Below MP	8.58	Diameter of Casing	2"
Water Column in Well	AS ~~16~~ 14.72	Total Purge Volume	12 gallons
Gallons per Foot	.16	Sampling Pump Intake (feet below MP)	
Gallons in Well	2.36 x 5 = 11.8		

Evacuation Method 2" submersible pump

SAMPLING DATA/FIELD PARAMETERS

Sampling Method teflon bailer

Color gray/brown Odor Ø Appearance slight turb. Temperature 20/20 °C

Specific Conductance (umhos/cm) 1,010/1,000 pH 6.82/6.91 Dissolved Oxygen 1.79/1.46 mg/L

Turbidity > 200 NTUs Eh — mV

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260B)	3 40-ml vials	HCL
SVOCs (8270C)	2 1-liter amber glass	None
Cyanide (9010)	950 ml plastic	NaOH
PP Metals & Barium (6010, 7060, 7740, 7841)	500 ml HDPE	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Aaron Steams, Jason Kirkpatrick

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

ARCADIS
GERAGHTY & MILLER

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF000320.00~~1~~6 Task 000~~1~~11 Page 1 of 1

Site Location Birmingham, Alabama Site/Well No. MW- 44

Sample I.D. 9906~~18~~21 AS - BT-13- GW0044 Coded/ Replicate No. Date 6 / ~~18~~ AS / 99

Weather Sunny 80's Purge Begin 0830 Purge Ended 0855 Time Collected 0900

EVACUATION DATA

Description of Measuring Point (MP) TOC KP 10/28/99

Height of MP Above/Below Land Surface	-	MP Elevation	-
Total Sounded Depth of Well Below MP	40.30	Water-Level Elevation	
Depth of Water Below MP	10.37	Diameter of Casing	2"
Water Column in Well	29.93	Total Purge Volume	24 gallons
Gallons per Foot	.16	Sampling Pump Intake (feet below MP)	
Gallons in Well	4.79x5=24 gallons		

Evacuation Method 2" submersible pump

SAMPLING DATA/FIELD PARAMETERS

Sampling Method teflon bailer

Color light yellow Odor odor Appearance clear Temperature 22/22/22 °C

Specific Conductance (umhos/cm) 850/850/850 pH 7.14/7.15/7.14 Dissolved Oxygen 1.20/1.00/1.05 mg/L

Turbidity 3.60 NTUs Eh - mV

Other

CONTAINER DESCRIPTION

From Lab X or G&M

Constituents Sampled	Container	Preservative
VOCs (8260B)	3 40-ml vials	HCL
SVOCs (8270C)	2 1-liter amber glass	None
Cyanide (9010)	950 ml plastic	NaOH
PP Metals & Barium (6010, 7060, 7740, 7841)	500 ml HDPE	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Aaron Stearns, Jason Kirkpatrick

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

APPENDIX A.6

DNAPL and LNAPL Bail Down Test and Monitoring Logs

ARCADIS
GERAGHTY & MILLER

MULTIPLE WELL MEASUREMENTS

Well No.	ft bTOC Well Depth	Date	Time	Depth to Water	Depth to Product	Product Thickness	SU	Remarks
MW-4A	21.8	6/14/99	1610	9.90	16.37			DNAPL
			1720	Start bailing product w/ bailer				
			1800	Finished bailing product - removed 0.8 gallons				
	JSK	~~6/15/99~~	~~1040~~	~~—~~	~~13.00~~			
		6/15/99	1040	13.10	21.2			
		6/17/99	1602	—	20.65			Suspect LNAPL at top
		6/19/99	1825	13.60	19.95			of column
		6/22/99	1850	12.70	19.60			

NOTES:

ARCADIS
GERAGHTY & MILLER

MULTIPLE WELL MEASUREMENTS

Well No.	Well Depth	Date	Time	Depth to Water	Depth to Product	Product Thickness	SU	Remarks
MW-6		6/14/99	1630	8.54	8.27			LNAPL
	pumped product out							
		6/14/99	1640	8.77	—			No product
			1650	8.47	8.47			Thin lens
			1700	8.36	8.36			Thin lens
			1719	8.33	8.32	0.01'		
		6/15/99	1519	8.26	8.25	~~0.09~~ 0.01'		Thin KB 10/12/99
		6/17/99	1554	8.23	–			~~No product, but~~
		6/19/99	1435	8.38	–			product on probe
		6/22/99	1900	8.58	–			

NOTES:

PROJ\TF320\BTFDNAPL\\FIELD\WLMFRM.xls

ARCADIS
GERAGHTY & MILLER

MULTIPLE WELL MEASUREMENTS

Well No.	Well Depth	Date	Time	Depth to Water	Depth to Product	Product Thickness	SU	Remarks
MW-1	30.38	8/26/99		8.48			ft	NP
MW-40	30.46	8/26/99		11.46			ft	NP
MW-41	18.84	8/26/99		7.49			ft	NP
MW-42	18.41	8/26/99		7.78			ft	NP
MW-43	23.45	8/26/99		9.10			ft	NP
MW-6	NM	8/26/99		8.64	8.63	0.01	ft	LNAPL
MW-10	61.26	8/26/99		8.82			ft	NP
MW-4A	NM	8/26/99		13.84	18.04		ft	DNAPL TD= 21.8 btoc
MW-3	47.52	9/23/99		7.81			ft	NP KA 10/4/99

NOTES: NM = Not Measured
NP = No Product in Well

PROJ\TF320\BTFDNAPL\FIELD\WLMFRM.xls

Katy Tholman

APPENDIX B

Analytical Data

SAMPLE DESIGNATION

A sample identification system has been developed to enable the field sampling personnel to establish unique and appropriate identifications for each sample collected. This system incorporates identifiers for the type of investigation, SWMU (when applicable), sample matrix, and the sample location. The identification number will consist of a date code, investigation code, SWMU code, sample matrix code, and sample number. Each of these codes is described below.

Date Code. The date code will consist of a six-digit number. The first two digits refer to the year, the second two digits refer to the month, and the last two digits refer to the day.

Investigation Code. The investigation code will consist of a two-character alpha code. The investigation codes for all samples collected throughout the five-year project are defined as follows.

Facility-Wide	FW
Coke Manufacturing	CO
Land Disposal Areas	LD
Chemical Manufacturing Plant	CM
Biological Treatment Facility	BT

SWMU Code. The SWMU code is a location code. This code will be a number, e.g., "21" for SWMU No. 21, "IW" for investigation-derived waste, or "00" for other samples without a specific location designation (i.e., for background samples) collected during the Facility-Wide Investigation.

Sample Matrix Code. This code includes field QC samples. The sample matrix code will be a two-character alpha code that describes the type of sample matrix. The following codes will be used:

Soil:	SL
Sediment:	SD
Surface Water:	SW
Groundwater (piezometer or monitor well):	GW
Ambient Air:	AA
Waste, Sludge, Landfills, Waste Piles:	SM
Field Blank (Water):	FB
Equipment Blank:	EB
Trip Blank:	TB
Process Water	PW

Sample Number Code. The sample number code will be a four-digit number starting with 0001, proceeding sequentially with 0002, 0003, through 0999. This allows for potentially 999 samples from any matrix at any SWMU.

<u>Field Replicate (Duplicate) Samples</u>. Field replicate samples will be uniquely identified with a "9" immediately following the matrix code. Specific notation of this number and the sample number of its mate shall be noted, with clarity, in the field logs. The Quality Assurance (QA) Officer shall be provided with these notes so that replicate analyses can be identified during data validation procedures.

<u>Examples</u>. The following numbers are provided as examples to illustrate how the sample coding will work for each matrix. Assume the field samples and the QC samples were collected during the Chemical Manufacturing Plant and BTF DNAPL and LMAPL investigation on June 7 through July 2, 1999.

Investigation-derived Soil Samples from Monitor Well 21:	990612-CM-IW-SL0040
Soil Samples from one interval at SWMU 26 location 1:	990617-CM-26-0001(0-1)
Sludge Sample from Location 1 at SWMU 13:	990617-BT-13-SM0001
Groundwater Sample from SWMU 13 at Monitor Well 13:	990619-BT-13-GW0040
Field Replicate of Soil from one interval at SWUM 26 Location 1:	990617-CM-26-SL9001
Field Blank associated with Soil Sampling at SWMU 27:	990617-CM-27-FB0001
Field Blank associated with groundwater sampling at SWMU 13:	990619-BT-13-FB0002
Equipment Blank associated with soil sampling at SWMU 29:	990612-CM-29-SLEB02
Trip Blank associated with SWMU 26:	990618-CM-26-TB0001

Note that the equipment blank identifier has the type of equipment designated before the "EB" designation. This is to allow for database sorting of samples by matrix and associated equipment blanks.

G:\proj\tf320birminghamqc\sampIDLD.doc

DATA VALIDATION CHECKLIST

Sample Identification(s):	ASI Report No. 109373	ASI Report No. 109428
	990617-BT-13-GW0041 MS/MSD	990621-BT-13-GW0038
	990617-BT-13-GW9041 *field dup*	990621-BT-13-GW0039
	990617-BT-13-GW0042	990621-BT-13-GW0044
	990617-BT-13-GW0043	990621-BT-13-TB0004
	990617-BT-13-FB0001	
	990617-BT-13-GWEB01	
	990617-BT-13-TB001	
	ASI Report No. 109390	
	990618-BT-13-GW0040	
	990618-CM-00-GW00P13D	
	990618-CM-00-GW00P13S	
	990618-LD-39-GW0034D	
	990618-LD-39-GW0034S	
	990618-BT-13-TB0002	
	990619-LD-39-GW0032	
	990619-LD-38-GW0026	
	990619-FW-00-GW00P15	
	990619-LD-38-TB0003	

ARCADIS Geraghty & Miller, Inc.
14497 North Dale Mabry Hwy,
Suite 115
Tampa, Florida 33618
Tel 813 961 1921
Fax 813 961 5299

Environmental

Project: Sloss Industries
June 1999 Groundwater
Sampling

Project Number: TF000320.0017
Task 0003

Sample Date(s):	6/17/99, 6/18/99, and 6/21/99	
Sample Team:	ARCADIS Geraghty & Miller, Inc. - K. Thalman, A. Stern	
Sample Matrix:	Liquid	
Analyzing Laboratory:	ASI, Norcross, GA – Contact Jill Warner	
Analyses:	VOC/8260	Total Cyanide/9014
	SVOC/8270	Metals:Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn
QA Reporting Level:	ARCADIS Geraghty & Miller, Inc. Level II	
Laboratory Report No.	109373, 109390, 109428	

FIELD DATA PACKAGE DOCUMENTATION

	Reported		Performance Acceptable		Not
Field Sampling Logs: *	No	Yes	No	Yes	Required
1. Sampling dates noted		X		X	
2. Sampling team indicated		X		X	
3. Sampling identification traceable to location collected		X		X	
4. Sample location		X		X	
5. Sample depth for soils		X		X	
6. Collection technique (bailer, pump, etc.)		X		X	
7. Field sample preparation techniques		X		X	
8. Sample type (grab, composite)		X		X	
9. Sample container type		X		X	
10. Preservation methods		X		X	
11. Chain-of-custody form completed		X		X	
12. Required analytical methods requested		X		X	
13. Field (water and soil) sample logs completed properly and signed		X		X	
14. Number and type of field QC samples collected (blanks, replicates, splits, etc.)		X		X	
15. Field equipment calibration		X		X	
16. Field equipment decontamination		X		X	
17. Sample shipping		X		X	
18. Laboratory task order		X		X	

FIELD DATA PACKAGE DOCUMENTATION

*Field sampling logs = water and/or soil/sediment sampling logs

QC - quality control

Comments: This section was completed after the review of field sampling logs and field notes.

14. The following field QC samples were collected in association with the June 1999, Sloss Industries groundwater sampling event. It should be noted that field QC samples (Field blanks, equipment blanks, field duplicates, MS/MSD), were collected at a frequency of 5% (1 per 20 field samples). Trip blanks were submitted for VOC analysis on each day VOC field samples were submitted to the laboratory.

- Field QC samples collected June 17, 1999 - ASI Report No. 109373
  MS/MSD 990617-BT-13-GW0041
  Field duplicate pair ID 990617-BT-13-GW0041 and 990617-BT-13-GW9041
  Equipment Blank - 990617-BT-13-GWEB01
  Field Blank – 990617-BT-13-FB0001
  Trip Blank – 990617-BT-13-TB001
- Field QC samples collected June 18, 1999 - ASI Report No. 109390
  Trip Blank – 990618-BT-13-TB0002
  Trip Blank – 990619-LD-38-TB0003
- Field QC samples collected June 21, 1999 - ASI Report No. 109428
  Trip Blank - 990621-BT-13-TB0004

It should be noted that Field and Equipment Blanks were analyzed for the same parameters as the field samples (full list). Trip Blanks were analyzed for VOC/Method 8260 analysis only.

ANALYTICAL DATA PACKAGE DOCUMENTATION
GENERAL INFORMATION

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample results		X		X	
2. Parameters analyzed		X		X	
3. Method of analysis		X		X	
4. Reporting limits of analysis		X		X	
5. Master tracking list		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preparation/extraction date		X		X	
9. Sample analysis date		X		X	
10. Copy of chain-of-custody form signed by lab sample custodian		X		X	
11. Narrative summary of QA or sample problems provided		X		X	

QA - quality assurance

Comments:
It is important to note that this validation is inclusive of the review of all Sloss groundwater samples collected during the June 1999 sampling event

INORGANIC ANALYSES
TOTAL METALS

	Reported		Performance Acceptable		Not
	No	Yes	No	Yes	Required
1. Holding times		X		X	
2. Reporting limits		X		X	
3. Calibration curve standards	X				X
4. Initial calibration verification %R	X				X
5. Continuing calibration verification %R	X				X
6. Blanks					
A. Preparation and calibration blanks		X		X	
B. Equipment rinsate blanks		X		X	
C. Field blanks		X		X	
7. Interference check sample %R (ICP only)	X				X
8. Serial dilution check %D (ICP only)	X				X
9. Reagent water spike (LCS) %R					
10. Reagent water spike duplicate (LCSD) RPD		X		X	
11. Matrix spike (MS) %R		X		X	
12. MS duplicate %R and MS/MSD RPD		X		X	
13. Laboratory duplicate RPD	X				X
14. Post-digestion analytical spike (FAA only)		X		X	
15. Field duplicate comparison	X			X	
16. Total and dissolved metals comparison	X				X

%R - percent recovery | %D - percent difference | RPD - relative percent difference
MSD - matrix spike duplicate | NA - not applicable or not analyzed
FAA - furnace atomic absorption | ICP - inductively coupled plasma atomic emission spectroscopy

Comments: This section was completed for the review of the following inorganic metals and cyanide. Performance was acceptable, with the following exceptions and notes:

6a. Method Blank (MB) - A MB was analyzed with each sample batch. No target analytes were detected in the associated method blanks.

6b. Equipment Blank (EQ Blk) - One EQ Blk was collected in association with the Sloss groundwater samples during the June 1999 sampling event.

ASI Report	Sample ID	Analyte detected	mg/L
109373	990617-BT-13-GWEB01	Zn	0.09

6c. Field Blank (Fld. Blk) - One Fld. Blk was collected in association with the Sloss groundwater samples during the June 1999 sampling event.

ASI Report	Sample ID	Analyte detected	mg/L
109373	990617-BT-13-FB0001	Zn	0.08

In accordance with the USEPA National Functional Guidelines, the highest concentration detected in the associated blank is applied to the field sample data. As shown above, Field Blank 990617-BT-13-GWEB01 concentration 0.09 mg/L X 5 => 45 mg/L was applied to all associated field sample Zn concentrations. All data values < 45 mg/L were qualified as "U/Not detected."

9-10. An LCS/LCSD was analyzed with each sample batch. All recoveries and Relative Percent Difference (RPD) were acceptable.

11-12.Additional volume of field sample 990617-BT-13-GW0041 was collected for MS/MSD analysis.
The following ASI field sample IDs were qualified due to MS/MSD (76-124% acceptance) Batch QC deficiencies:

ASI Report	Analytes	ASI Sample ID
109373	Tl(74/53)	Associated with ALL Sloss groundwater samples in reports 109373, 109390, 109428 *Tl Non detected values qualified "UJ"*

It should be noted that ALL Thallium results were BDL and the S/MSD RPD 33% also failed the control limit (0-20)

INORGANIC ANALYSES *(Continued)*

14. It should be noted that analytes listed in the table above (with the exception of Ag and Hg) did not meet the required recovery limit and Post Digested Spike (PDS) analysis was performed to further evaluate the sample matrix. All PDS recoveries were reviewed however, in accordance with the NFG no data are qualified based on PDS recoveries. All PDS recoveries met the 76-124% acceptance criteria.
15. Blind field duplicates were submitted to the laboratory at a frequency of 5% (1 every 20 primary field samples). Field duplicates were assessed using 20%RPD for liquid matrices greater than 5X the reporting limit and 35%RPD for solid matrices greater than 5X the reporting limit. One field duplicate was collected in association with Sloss groundwater sampling in June 1999. All results were comparable.

ASI Report	Primary Field Sample	Field Duplicate
109393	990617-BT-13-GW0041	990617-BT-13-GW9041 **comparable*

ORGANIC ANALYSES
VOLATILE ORGANIC COMPOUNDS

	Reported		Performance Acceptable		Not
	No	Yes	No	Yes	Required
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
1. Holding times		X		X	
2. Reporting limits		X		X	
3. Blanks					
A. Water blanks (VOCs)		X		X	
B. Equipment rinsate blanks		X		X	
C. Field Blanks		X		X	
D. Trip blanks		X		X	
4. Instrument tune and performance check	X				X
5. Initial calibration RRFs and %RSDs	X				X
6. Continuing calibration RRFs and %Ds	X				X
7. Matrix spike (MS) %R		X		X	
8. Matrix spike duplicate (MSD) %R		X		X	
9. MS/MSD precision (RPD)		X		X	
10. Laboratory duplicate precision (optional)	X				X
11. Reagent water spike (LCS)		X		X	
12. Reagent water spike duplicate (LCSD)		X		X	
13. LCS/LCSD precision (RPD)		X		X	
14. Surrogate spike recoveries		X		X	
15. Internal standard retention times and areas	X				X
16. Compound identification and quantitation					
A. Reconstructed ion chromatograms	X				X
B. Quantitation reports	X				X
17. TIC search (optional)	X				X
18. Field duplicate comparison	X			X	

VOCs - volatile organic compounds
RRF - relative response factor
% RSD - percent relative standard deviation
TIC - tentatively identified compound
%D - percent drift
%R - percent recovery
RPD - relative percent difference
LCS - blank spike
LCSD - blank spike duplicate

Comments:

This section was completed for the review of VOC by Method 8260. Performance was acceptable, with the following exceptions and notes:

3. a) Method Blanks (MB) - Method blank was analyzed with each analytical batch and on each day of sample analysis. All method blanks were free of contamination.
   b) Equipment Blanks (EQ Blk) – One EQ Blk (990617-BT-13-GWEB01) was collected in association with the Sloss groundwater samples during the June 1999 sampling event. No target analytes were detected in the EQ Blk.
   c) Field Blank (Fld. Blk) - One Fld. Blk (990617-BT-13-FB0001) was collected in association with the Sloss groundwater samples during the June 1999 sampling event. No target analytes were detected in the Fld. Blk.
   d) Trip Blanks – Four Trip blanks were submitted with the Sloss groundwater June 1999 sampling. All trip blanks were free of contamination.

7-9. Additional volume of field sample 990617-BT-13-GW0041 was collected for MS/MSD analysis.

ORGANIC ANALYSES
VOLATILE ORGANIC COMPOUNDS *(Continued)*

7-9. ASI Report 109373

It should be noted that two VOC analytical batches were associated with this report. Sloss field sample 990617-BT-13-GW0041 was used for one batch, all recoveries were acceptable and the Sloss equipment blank was used for the other batch MS/MSD. The laboratory has been notified of the Sloss field identification of equipment blanks. No qualification was necessary.

ASI Report 109390

Sloss field sample 990617-BT-13-GW0041 was collected for MS/MSD analysis. All recoveries and RPD values were acceptable.

ASI Report 109428

Sloss field sample 990617-BT-13-GWEB01 was selected by the laboratory for MS/MSD analysis. See note above in ASI Report 109373 with regards to the EQ Blk. Being used.

11-13. An LCS/LCSD was analyzed with each sample batch. All recoveries and Relative Percent Difference (RPD) were acceptable.

14. Surrogate recoveries were reviewed for each analytical run. All surrogate recoveries were acceptable.

18. Blind field duplicates were submitted to the laboratory at a frequency of 5% (1 every 20 primary field samples). Field duplicates were assessed using 20%RPD for liquid matrices greater than 5X the reporting limit and 35%RPD for solid matrices greater than 5X the reporting limit. One field duplicate was collected in association with the Sloss groundwater sampling in June 1999.

ASI Report	Primary Field Sample	Field Duplicate
109373	990617-BT-13-GW0041	990617-BT-13-GW9041 **comparable*

ORGANIC ANALYSES
SEMIVOLATILE ORGANIC COMPOUNDS

	Reported No	Reported Yes	Performance Acceptable No	Performance Acceptable Yes	Not Required
GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)					
1. Holding times					
A. Extraction holding time		X		X	
B. Analysis holding time		X		X	
2. Reporting limits		X		X	
3. Blanks					
A. Extraction blanks		X		X	
B. Equipment rinsate blanks		X		X	
C. Field Blanks		X		X	
4. Instrument tune and performance check	X				X
5. Initial calibration RRFs and %RSDs	X				X
6. Continuing calibration RRFs and %Ds	X				X
7. Matrix spike (MS) %R		X		X	
8. Matrix spike duplicate (MSD) %R		X		X	
9. MS/MSD precision (RPD)		X		X	
10. Laboratory duplicate precision (optional)	X				X
11. Laboratory control sample (LCS)		X		X	
12. LCS duplicate (LCSD)		X		X	
13. LCS/LCSD precision (RPD)		X		X	
14. Surrogate spike recoveries		X		X	
15. Internal standard retention times and areas	X				X
16. Compound identification and quantitation					
A. Reconstructed ion chromatograms	X				X
B. Quantitation reports	X				X
17. TIC search (optional)	X				X
18. Field duplicate comparison	X			X	

SVOCs - semivolatile organic compounds
RRF - relative response factor
% RSD - percent relative standard deviation
TIC - tentatively identified compound
%D - percent drift
%R - percent recovery
RPD - relative percent difference
LCS - blank spike
LCSD - blank spike duplicate

Comments: This section was reviewed and completed for semivolatile (SVOC) analysis by Method 8270. Performance was acceptable, with the following exceptions and notes:

1. All Sloss field samples were extracted and analyzed within the method specified hold time criteria.
2. All reporting limits were appropriately elevated to present the lowest possible limit of detection. It should be noted that all of the field samples in ASI Report 109373 produced emulsions, and that 990621-BT-13-GW0038 required a dilution of 10X due to high concentrations of naphthalene (420 ug/L).
3. a) Extraction Blanks or Method Blanks (MB) - Method blank was analyzed with each analytical batch and on each day of sample analysis. All method blanks were free of contamination.

   b) Equipment Blanks (EQ Blk) – One EQ Blk (990617-BT-13-GWEB01) was collected in association with the Sloss groundwater samples during the June 1999 sampling event. No target analytes were detected in the EQ Blk.

ORGANIC ANALYSES
SEMIVOLATILE ORGANIC COMPOUNDS *(Continued)*

3. c) Field Blank (Fld. Blk) - One Fld. Blk (990617-BT-13-FB0001) was collected in association with the Sloss groundwater samples during the June 1999 sampling event. No target analytes were detected in the Fld. Blk.

7-9. Additional volume of field sample 990617-BT-13-GW0041 was collected for MS/MSD analysis. All MS/SD recoveries and RPD values were acceptable with the exception of phenol (51/29% Rec and 54% RPD) which did not meet the laboratory established RPD control limit criteria of (0-32). It should be noted that this sample was associated with all of the Sloss groundwater SVOC samples

11-13. An LCS/LCSD was analyzed with each sample batch. All recoveries and Relative Percent Difference (RPD) were acceptable.

14. Surrogate spike recoveries were reviewed for all analysis (initial and re-analysis/dilutions). All surrogates recoveries were acceptable.

18. Blind field duplicates were submitted to the laboratory at a frequency of 5% (1 every 20 primary field samples). Field duplicates were assessed using 20%RPD for liquid matrices greater than 5X the reporting limit and 35%RPD for solid matrices greater than 5X the reporting limit. One field duplicate was collected in association with the Sloss groundwater sampling in June 1999.

ASI Report	Primary Field Sample		Field Duplicate		
108995	990617-BT-13-GW0041		990617-BT-13-GW9041		
Analyte	Primary(P)	Qualifier(P)	Field Dup(FD)	Qualifier(FD)	RPD
Naphthalene	84	J	65	J	26

Validation Summary

All analytical data contained in the referenced ASI data packages for groundwater were reviewed in accordance with the USEPA National Functional Guidelines for the Review of Inorganic and Organic Data, dated February 1994, the method specific criteria, and professional judgement were applicable. A summary of qualified groundwater data are presented in the attached table titled "Sloss Industries-June 1999, Summary of Qualified Groundwater Data." All qualified analytical results are classified as qualitative. A detailed explanation of qualification is presented in the corresponding data section. All other data are classified as quantitative.

VALIDATION PERFORMED BY
SIGNATURE: Cindy Arnold

DATE: 10/26/99

G:/proj/TF320/QAQC/June99699gwdvF.doc

Sloss Industries - June 1999
Summary of Qualified Groundwater Data

G & M Sample I.D.	Analyte	Concentration Detected	Qualifier	Reasons for Qualification
ASI Laboratory Report No 109373				
990617-BT-13-GW0041	Thallium	BDL	UJ	MS/MSD Rec.
	Zinc	0.17 mg/L	U	Blank Contamination
	Naphthalene	84 ug/L	J	Field Dup. RPD >20 %
990617-BT-13-GW9041	Thallium	BDL	UJ	MS/MSD Rec.
	Zinc	0.12 mg/L	U	Blank Contamination
	Naphthalene	65 ug/L	J	Field Dup. RPD >20 %
990617-BT-13-GW0042	Thallium	BDL	UJ	MS/MSD Rec.
	Zinc	0.10 mg/L	U	Blank Contamination
990617-BT-13-GW0043	Thallium	BDL	UJ	MS/MSD Rec.
	Zinc	0.07 mg/L	U	Blank Contamination
ASI Laboratory Report No 109390				
990618-LD-39-GW0040	Thallium	BDL	UJ	MS/MSD Rec.
	Zinc	0.09 mg/L	U	Blank Contamination
ASI Laboratory Report No 109428				
990621-BT-13-GW0038	Thallium	BDL	UJ	MS/MSD Rec.
	Zinc	0.32 mg/L	U	Blank Contamination
990621-BT-13-GW0039	Thallium	BDL	UJ	MS/MSD Rec.
	Zinc	0.24 mg/L	U	Blank Contamination
990621-BT-13-GW0044	Thallium	BDL	UJ	MS/MSD Rec.
	Zinc	0.07 mg/L	U	Blank Contamination

Notes:

UJ - Non detected estimated
J - Estimated
R - Rejected (unusable data)
MS - Matrix spike
MSD - Matrix spike duplicate

RPD - Relative percent difference
PDS - Post digested spike
BDL - Below detection limit
ug/L - microgram/litre (ppb)
mg/L - milligram/litre (ppm)

ASI

ANALYTICAL SERVICES, INC.

ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS

110 TECHNOLOGY PARKWAY • NORCROSS, GA 30092
(770) 734-4200 • FAX (770) 734-4201

ARCADIS Geraghty & Miller, Inc
Project Name: Sloss Industries
Project Number: TF0003200016
ASI Report #109390

ASI Sample ID	ARCADIS Sample ID :	Analysis	Notes
109390-1	990618-BT-13-GW0040	CN, Metals, 8260, 8270	
109390-2	990618-CM-00-GW00P13D	8260	
109390-3	990618-CM-00-GW00P13S	8260	
109390-4	990618-LD-39-GW0034D	8260	
109390-5	990618-LD-39-GW0034	CN	
109390-6	990618-BT-13-TB0002	8260	
109390-7	990619-LD-39-GW0032	CN	
109390-8	990619-LD-38-GW0026	8260	
109390-9	990619-FW-00-GW00P15	8260	
109390-10	990619-LD-38-TB0003	8260	

ASI ANALYTICAL SERVICES, INC.
ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS
110 TECHNOLOGY PARKWAY • NORCROSS GA 30092
(770) 734-4200 • (770) 734-4201 FAX

6 July, 1999

Case Narrative ASI Sample 109390

Ten aqueous samples were collected on 18 June, 1999 and arrived at ASI on 19 June, 1999. The sample cooler temperature blank was 1°C upon arrival at ASI as indicated on the Chain of Custody. The samples were logged into LIMS as ASI sample 109390 for aqueous analysis of BNA, VOC, metals, and cyanide. All holding times were met.

Base neutrals/acids were analyzed in batch 49282 using EPA method 8270. The MS RPD for phenol was high. All other measurement quality objectives were met.

Volatile organics were analyzed in batch 49357 using EPA method 8260. All measurement quality objectives were met.

Mercury was analyzed in batch 49103 using EPA method 7470. The sample duplicate RPD was slightly high. All other measurement quality objectives for mercury were met. Thallium, arsenic, and selenium were analyzed in batch 48711 using EPA methods 7841, 7060, 7740, respectively. The MS RPD for thallium was low due to a low MSD recovery. All other measurement quality objectives were met. ICP metals were analyzed in batch 48723 using EPA method 6010. All samples were redigested and reanalyzed. All other measurement quality objectives were met.

Cyanide was analyzed in batch 49543 using EPA method 9014. All measurement quality objectives were met.

Respectfully yours,

Jon Neuhaus
Quality Assurance

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109390-1**

August 4, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990618-BT-13-GW0040, 06/18/99, 13:15, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
		General Chemistry				
57125	Total Cyanide	BDL	0.02	mg/L	1	EPA 9014
		Priority Pollutant Metals				
		Metals				
7440360	Total Antimony	BDL	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	BDL	0.01	mg/L	1	EPA 7060A
7440393	Total Barium	0.09	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	BDL	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	BDL	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	BDL	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	BDL	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	BDL	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	BDL	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	BDL	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	BDL	0.04	mg/L	1	EPA 7740
7440224	Total Silver	BDL	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	BDL	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	0.09	0.02	mg/L	1	EPA 6010A
		Volatile Organics (EPA 8260B)				
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	16	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	19	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990618-BT-13-GW0040, 06/18/99, 13:15, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	12	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	10	ug/L	1	EPA 8270C
95578	2-Chlorophenol	BDL	10	ug/L	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270C
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270C
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270C
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270C
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270C
100027	4-Nitrophenol	BDL	50	ug/L	1	EPA 8270C
87865	Pentachlorophenol	BDL	10	ug/L	1	EPA 8270C
108952	Phenol	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: 109390-1 August 4, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990618-BT-13-GW0040, 06/18/99, 13:15, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	15	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	BDL	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
1587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	BDL	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	BDL	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270C
206440	Fluoranthene	11	10	ug/L	1	EPA 8270C
86737	Fluorene	10	10	ug/L	1	EPA 8270C
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270C
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	10	ug/L	1	EPA 8270C
78591	Isophorone	BDL	10	ug/L	1	EPA 8270C
91576	2-Methylnaphthalene	15	10	ug/L	1	EPA 8270C
91203	Naphthalene	98	10	ug/L	1	EPA 8270C
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: **109390-1** August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990618-BT-13-GW0040, 06/18/99, 13:15, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270C
621647	N-Nitrosodi-n-propylamine	BDL	10	ug/L	1	EPA 8270C
85018	Phenanthrene	23	10	ug/L	1	EPA 8270C
129000	Pyrene	BDL	10	ug/L	1	EPA 8270C
110861	Pyridine	BDL	10	ug/L	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	12	10	ug/L	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109390-2**

August 4, 19[illegible]

Sample Description
Sloss Industries
Water, Birmingham, Project #TF0003200016, 990618-CM-00-GW00P13D, 06/18/99, 15:30, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260E
107028	Acrolein	BDL	50	ug/L	1	EPA 8260E
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260E
71432	Benzene	BDL	5	ug/L	1	EPA 8260E
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260E
75252	Bromoform	BDL	5	ug/L	1	EPA 8260E
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260E
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260I
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260I
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260I
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260I
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260
67663	Chloroform	BDL	5	ug/L	1	EPA 8260
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 826C
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 826C
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 826C
75092	Methylene chloride	BDL	5	ug/L	1	EPA 826C
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 826C
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 826C
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 826C
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 826(
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 826(
591786	2-Hexanone	BDL	50	ug/L	1	EPA 826(
74884	Iodomethane	BDL	5	ug/L	1	EPA 826(
78933	2-Butanone	BDL	50	ug/L	1	EPA 826(

BDL - Below Detection Limit

Report No.: **109390-2** August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990618-CM-00-GW00P13D, 06/18/99, 15:30, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	3	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	18	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI
ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109390-3**

August 4, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990618-CM-00-GW00P13S, 06/18/99, 15:50, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	120	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Report No.: 109390-3 August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990618-CM-00-GW00P13S, 06/18/99, 15:50, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	BDL	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	41	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

A N A L Y T I C A L S E R V I C E S, I N C .

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109390-4**

August 4, 199

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990618-LD-39-GW0034D, 06/18/99, 17:00, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
			Volatile Organics (EPA 8260B)			
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Report No.: 109390-4 August 4, 1

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990618-LD-39-GW0034D, 06/18/99, 17:00, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytic Metho
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 826
100425	Styrene	BDL	5	ug/L	1	EPA 826
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 826
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 826
108883	Toluene	BDL	2	ug/L	1	EPA 826
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 826
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 826
79016	Trichloroethene	BDL	2	ug/L	1	EPA 826
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 826
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 826
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 826
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 826
1330207	Xylenes	BDL	5	ug/L	1	EPA 826

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109390-5**

August 4, 19

Sample Description
Sloss Industries
Water, Birmingham, Project #TF0003200016, 990618-LD-39-GW0034S, 06/18/99, 17:00, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
			General Chemistry			
57125	Total Cyanide	0.17	0.02	mg/L	1	EPA 901

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109390-6**

August 4, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990618-BT-13-TB0002, 06/18/99, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990618-BT-13-TB0002, 06/18/99, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260
100425	Styrene	BDL	5	ug/L	1	EPA 8260
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260
108883	Toluene	BDL	2	ug/L	1	EPA 8260
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI
ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109390-7**

August 4, 19

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990619-LD-39-GW0032, 06/19/99, 12:35, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
	General Chemistry					
57125	Total Cyanide	0.36	0.02	mg/L	1	EPA 901

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109390-8**

August 4, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990619-LD-38-GW0026, 06/19/99, 12:50, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	14	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
5252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	5	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B

BDL - Below Detection Limit

KP 10/20

Report No.: 109390-8 August 4, 19

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990619-LD-38-GW0026, 06/19/99, 12:50, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260
100425	Styrene	BDL	5	ug/L	1	EPA 8260
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260
108883	Toluene	26	2	ug/L	1	EPA 8260
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260
1330207	Xylenes	29	5	ug/L	1	EPA 8260

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin

Report No.: **109390-9**

August 4, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990619-FW-00-GW00P15, 06/19/99, 13:25, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Report No.: 109390-9 August 4, 1

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990619-FW-00-GW00P15, 06/19/99, 13:25, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytic Metho
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 826
100425	Styrene	BDL	5	ug/L	1	EPA 826
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 826
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 826
108883	Toluene	BDL	2	ug/L	1	EPA 826
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 826
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 826
79016	Trichloroethene	BDL	2	ug/L	1	EPA 826
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 826
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 826
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 826
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 826
1330207	Xylenes	BDL	5	ug/L	1	EPA 826

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin

Report No.: **109390-10**

August 4, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990619-LD-38-TB0003, 06/18/99, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B

BDL - Below Detection Limit

KP
10/26/1c

Report No.: 109390-10 August 4, 19

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990619-LD-38-TB0003, 06/18/99, received 06/19/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260I
100425	Styrene	BDL	5	ug/L	1	EPA 8260I
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260I
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260I
108883	Toluene	BDL	2	ug/L	1	EPA 8260I
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260I
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260I
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260I
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260I
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260I
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260I
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260I
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260I

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

Analytical Services Inc. Batch QC
For Report Number :109390
Base Neutrals / Acids

Matrix : Aqueous   Batch # 49282   Method : EPA 8270

Lab Control Information Analyte	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
Phenol	29	27	5	12 - 89	0 - 42
2-Chlorophenol	67	56	17	27 - 123	0 - 40
1,4-Dichlorobenzene	51	39	27	36 - 97	0 - 28
N-Nitrosodipropylamine	88	71	21	41 - 116	0 - 38
1,2,4-Trichlorobenzene	64	49	27	44 - 142	0 - 28
4-Chloro-3-methylphenol	87	78	11	23 - 97	0 - 42
Acenaphthene	84	67	23	46 - 118	0 - 31
2,4-Dinitrotoluene	80	74	7	24 - 96	0 - 38
4-Nitrophenol	25	24	2	10 - 80	0 - 50
Pentachlorophenol	95	83	14	9 - 103	0 - 50
Pyrene	103	93	10	26 - 127	0 - 31

Matrix Spike Information Analyte	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
Phenol	51	29	54	15 - 64	0 - 32
2-Chlorophenol	75	54	32	36 - 87	0 - 35
1,4-Dichlorobenzene	59	47	23	31 - 83	0 - 31
N-Nitrosodipropylamine	92	78	17	42 - 108	0 - 33
1,2,4-Trichlorobenzene	72	63	13	35 - 96	0 - 33
4-Chloro-3-methylphenol	92	76	19	35 - 99	0 - 26
Acenaphthene	91	77	17	47 - 113	0 - 28
2,4-Dinitrotoluene	85	77	9	34 - 109	0 - 30
4-Nitrophenol	54	37	37	6 - 69	0 - 44
Pentachlorophenol	100	105	5	12 - 106	0 - 44
Pyrene	107	103	4	55 - 133	0 - 28

Analytical Services Inc. Batch QC
Surrogate Recovery
Base Neutrals / Acids

Matrix : Aqueous   Batch # 49282   Method : EPA 8270

% Recovery Objectives

S1	2-Fluorophenol	21 - 100
S2	Phenol-d5	10 - 94
S3	Nitrobenzene-d5	35 - 114
S4	2-Fluorobiphenyl	43 - 116
S5	2,4,6-Tribromophenol	10 - 123
S6	Terphenyl-d14	33 - 141

Sample	File	S1	S2	S3	S4	S5	S6
49282BLK	B3118	30	19	62	62	83	86
49282LCS	B3119	37	27	78	81	106	97
49282LCSD	B3120	39	26	63	62	96	87
109119-10MS	B3121	64	50	85	88	111	98
109119-10MSD	B3122	38	28	72	74	98	93
109119-10	B3123	40	28	76	80	101	98
109119-11	B3124	41	25	75	73	88	95
108995-14	B3125	31	21	60	59	73	80
108995-15	B3126	32	24	71	71	84	87
109373-3DUP	B3347	30	22	68	72	121	72
109373-4	B3351	32	23	74	67	91	67
109373-3	B3350	36	25	79	88	119	74
109373-5	B3352	30	23	73	65	91	73
109373-6	B3353	30	22	73	61	88	78
109373-7	B3354	38	25	81	72	96	91
109373-8	B3355	33	23	73	66	83	99
109428-1	B3356	28	19	57	54	93	90
109428-2	B3357	30	20	52	53	101	74
109428-3	B3358	39	24	76	67	111	70
109390-1	B3346	38	24	71	68	111	79
109428-2D	A8085	27	21	50	74	81	91
^^Note: 1:10 DILUTION							
109373-1	B3348	29	22	68	61	88	62
109373-2	B3349	34	23	76	74	113	79
DAYBL06/23	A8099	50	33	78	86	78	76
DAYBL06/14	B3053	66	50	81	82	89	94
DAYBL06/01	A7770	35	26	70	67	66	89
DAYBL06/22	A8076	38	25	70	73	77	82
109373-5MS	A8209	34	25	64	69	72	59
109373-6MSD	A8210	28	23	56	68	82	69
109373-5MSRR	A8219	35	26	67	76	80	77

Q.C. Information for Batch # 49282   Printed: 08/04/99 19:24:57

Blank Results Information

Base Neutrals / Acids   Method : EPA 8270

Analyte	Blank Result	Detection Limit
4-Chloro-3-methylphenol	BDL	10
2-Chlorophenol	BDL	10
2,4-Dichlorophenol	BDL	10
2,6-Dichlorophenol	BDL	10
2,4-Dimethylphenol	BDL	10
2-Methyl-4,6-dinitrophenol	BDL	50
2,4-Dinitrophenol	BDL	50
2-Methylphenol	BDL	10
3-Methylphenol	BDL	10
4-Methylphenol	BDL	10
2-Nitrophenol	BDL	10
4-Nitrophenol	BDL	50
Pentachlorophenol	BDL	10
Phenol	BDL	10
2,4,5-Trichlorophenol	BDL	10
2,4,6-Trichlorophenol	BDL	10
2,3,4,6-Tetrachlorophenol	BDL	10
Acenaphthene	BDL	10
Acenaphthylene	BDL	10
Anthracene	BDL	10
Benzo(a)anthracene	BDL	10
Benzo(b)fluoranthene	BDL	10
Benzo(k)fluoranthene	BDL	10
Benzo(g,h,i)perylene	BDL	10
Benzo(a)pyrene	BDL	10
Benzyl Alcohol	BDL	10
Bis(2-chloroethoxy)methane	BDL	10
Bis(2-chloroethyl)ether	BDL	10
Bis(2-chloroisopropyl)ether	BDL	10
Bis(2-ethylhexyl)phthalate	BDL	10
4-Bromophenyl phenyl ether	BDL	10
p-Chloroaniline	BDL	10
2-Chloronaphthalene	BDL	10
4-Chlorophenyl phenyl ether	BDL	10
Chrysene	BDL	10
Dibenz(a,h)anthracene	BDL	10
Dibenzofuran	BDL	10
Di-n-butylphthalate	BDL	10
1,3-Dichlorobenzene	BDL	10
1,4-Dichlorobenzene	BDL	10
1,2-Dichlorobenzene	BDL	10
3,3'-Dimethylbenzidine	BDL	100
Diethylphthalate	BDL	10
Dimethylphthalate	BDL	10
2,4-Dinitrotoluene	BDL	10
2,6-Dinitrotoluene	BDL	10
Di-n-octylphthalate	BDL	10
Fluoranthene	BDL	10
Fluorene	BDL	10

Q.C. Information for Batch # 49282 Printed: 08/04/99 19:24:57

Blank Results Information
Base Neutrals / Acids Method : EPA 8270

Analyte	Blank Result	Detection Limit
Hexachlorobenzene	BDL	10
Hexachlorobutadiene	BDL	10
Hexachlorocyclopentadiene	BDL	10
Hexachloroethane	BDL	2
Indeno(1,2,3-cd)pyrene	BDL	10
Isophorone	BDL	10
2-Methylnaphthalene	BDL	10
Naphthalene	BDL	10
2-Nitroaniline	BDL	10
3-Nitroaniline	BDL	10
4-Nitroaniline	BDL	10
Nitrobenzene	BDL	10
N-Nitrosodimethylamine	BDL	10
N-Nitrosodi-n-propylamine	BDL	10
Phenanthrene	BDL	10
Pyrene	BDL	10
Pyridine	BDL	10
1,2,4-Trichlorobenzene	BDL	10

Q.C. Information for Batch # 49282 Printed: 08/04/99 19:24:57

Sample Batch Information
Base Neutrals / Acids Method : EPA 8270

Sample ID	Preparation Date	Time	By	Preparation Notes	Analysis Date	Time	By	Ins
49282BLK	06/15/99	1100	SVOA		06/16/99	1627	RAC	597
49282LCS	06/15/99	1100	SVOA		06/16/99	1658	RAC	597
49282LCSD	06/15/99	1100	SVOA		06/16/99	1729	RAC	597
109119-10	06/15/99	1100	SVOA		06/16/99	1901	RAC	597
109119-10MS	06/15/99	1100	SVOA	QC	06/16/99	1800	RAC	597
109119-10MSD	06/15/99	1100	SVOA	QC	06/16/99	1831	RAC	597
109119-11	06/15/99	1100	SVOA		06/16/99	1932	RAC	597
108995-14	06/14/99	1015	SVOA		06/16/99	2003	RAC	597
108995-15	06/14/99	1015	SVOA		06/16/99	2033	RAC	597
DAYBL06/14	06/14/99	1015	SVOA		06/14/99	2033	TAS	597
DAYBL06/22	06/22/99	0900	SVOA		06/28/99	1839	RAC	597
109390-1	06/22/99	0900	SVOA		06/26/99	0407	RAC	597
DAYBL06/23	06/23/99	1100	SVOA		06/29/99	1942	RAC	597
109373-3DUP	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0440	RAC	597
109373-1	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0513	TAS	597
109373-2	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0545	TAS	597
109373-3	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0618	RAC	597
109373-4	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0651	RAC	597
109373-5	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0724	RAC	597
109373-6	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0756	RAC	597
109373-7	06/23/99	1100	SVOA		06/26/99	0829	RAC	597
109373-8	06/23/99	1100	SVOA		06/26/99	0902	RAC	597
109428-1	06/23/99	1100	SVOA		06/26/99	0935	RAC	597
109428-2	06/23/99	1100	SVOA		06/26/99	1007	RAC	597
109428-3	06/23/99	1100	SVOA		06/26/99	1040	RAC	597
109373-11	/ /				06/26/99	0513	RAC	597
109373-12	/ /				06/26/99	0545	RAC	597
109428-2D	/ /				06/28/99	2346	RAC	597
DAYBL06/01	/ /				06/04/99	1146	RAC	597
DAYBL07/06	07/06/99	1430	SVOA		/ /			
109373-5MS	07/06/99	1430	SVOA		07/08/99	0300	TAS	59
109373-6MSD	07/06/99	1430	SVOA		07/08/99	0334	TAS	59
109373-5MSRR	07/07/99	1730	SVOA		07/08/99	0832	TAS	59

Analytical Services Inc. Batch QC
For Report Number :109390
Volatile Organics

Matrix : Aqueous | Batch # 49357 | Method : EPA 8260

Lab Control Information Analyte	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
1,1-Dichloroethene	88	83	6	72 - 119	0 - 18
Trichloroethene	103	98	5	76 - 114	0 - 18
Benzene	106	99	7	79 - 113	0 - 16
Toluene	103	95	8	73 - 115	0 - 17
Chlorobenzene	111	101	9	76 - 115	0 - 18

Matrix Spike Information Analyte	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
1,1-Dichloroethene	78	91	15	61 - 122	0 - 25
Trichloroethene	93	101	8	72 - 136	0 - 16
Benzene	105	113	7	83 - 126	0 - 15
Toluene	92	100	8	81 - 121	0 - 17
Chlorobenzene	96	106	10	86 - 125	0 - 14

Analytical Services Inc. Batch QC
Surrogate Recovery
Volatile Organics

Matrix : Aqueous Batch # 49357 Method : EPA 8260

% Recovery Objectives

S1	Dibromofluoromethane	78 - 128
S2	1,2-Dichloroethane-d4	82 - 129
S3	Toluene-d8	85 - 112
S4	4-Bromofluorobenzene	82 - 113

Sample	File	S1	S2	S3	S4	S5	S6
49357BLK	B4720	101	102	94	88		
49357LCS	B4716	101	104	96	89		
49357LCSD	B4717	102	105	96	89		
108995-16	B4724	102	105	94	87		
108995-14	B4725	102	106	95	88		
108995-15	B4726	103	105	95	89		
109054-10	B4727	102	103	96	90		
109119-10	B4728	102	103	95	89		
109119-11	B4729	103	106	95	90		
109119-12	B4730	103	106	96	88		
DAYBL 06/26	B4881	103	108	97	99		
109390-8	B4882	102	108	101	100		
109390-1	B4883	102	108	98	100		
109390-2	B4884	104	109	99	97		
109390-3	B4885	103	111	99	97		
109390-4	B4886	103	111	97	98		
109390-6	B4887	105	111	97	95		
109390-9	B4888	104	111	97	94		
109390-10	B4889	105	109	96	95		
109373-1	B4890	106	110	96	93		
109373-2	B4891	106	112	95	93		
109373-3	B4892	106	114	94	92		
109373-4	B4893	106	111	95	92		
109373-5MS	B4894	104	109	97	92		
109373-6MSD	B4895	104	110	96	94		
109373-7	B4896	105	109	96	91		

Q.C. Information for Batch # 49357 Printed: 08/04/99 19:24:59

Blank Results Information
Volatile Organics Method : EPA 8260

Analyte	Blank Result	Detection Limit
Acetone	BDL	50
Acrolein	BDL	50
Acrylonitrile	BDL	50
Benzene	BDL	5
Bromodichloromethane	BDL	5
Bromoform	BDL	5
Bromomethane	BDL	10
Carbon disulfide	BDL	5
Carbon tetrachloride	BDL	5
Chlorobenzene	BDL	5
Chloroethane	BDL	5
2-Chloroethyl vinyl ether	BDL	10
Chloroform	BDL	5
Chloromethane	BDL	10
Dibromochloromethane	BDL	5
1,2-Dibromoethane	BDL	1
Dibromomethane	BDL	2
trans-1,4-Dichloro-2-butene	BDL	10
Dichlorodifluoromethane	BDL	5
1,1-Dichloroethane	BDL	5
1,2-Dichloroethane	BDL	5
trans-1,2-Dichloroethene	BDL	5
1,1-Dichloroethene	BDL	5
Methylene chloride	BDL	5
1,2-Dichloropropane	BDL	5
cis-1,3-Dichloropropene	BDL	5
trans-1,3-Dichloropropene	BDL	5
Ethylbenzene	BDL	5
Ethyl methacrylate	BDL	5
2-Hexanone	BDL	50
Iodomethane	BDL	5
2-Butanone	BDL	50
4-Methyl-2-pentanone	BDL	50
Styrene	BDL	5
1,1,2,2-Tetrachloroethane	BDL	5
Tetrachloroethene	BDL	5
Toluene	BDL	2
1,1,1-Trichloroethane	BDL	2
1,1,2-Trichloroethane	BDL	2
Trichloroethene	BDL	2
Trichlorofluoromethane	BDL	5
1,2,3-Trichloropropane	BDL	2
Vinyl acetate	BDL	10
Vinyl chloride	BDL	1
Xylenes	BDL	5

Sample Batch Information
Volatile Organics Method : EPA 8260

Sample ID	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Ins
49357BLK	/ /				06/18/99	1709	REG	VOA
49357LCS	/ /				06/18/99	1504	REG	VOA
49357LCSD	/ /				06/18/99	1535	REG	VOA
108995-16	/ /				06/18/99	1914	REG	VOA
108995-14	/ /				06/18/99	1945	REG	VOA
108995-15	/ /				06/18/99	2016	REG	VOA
109054-10	/ /				06/18/99	2047	REG	VOA
109119-10	/ /				06/18/99	2118	REG	VOA
109119-11	/ /				06/18/99	2150	REG	VOA
109119-12	/ /				06/18/99	2221	REG	VOA
DAYBL 06/26	/ /				06/26/99	2127	LLP	VOA
109390-8	/ /				06/26/99	2158	LLP	VOA
109390-1	/ /				06/26/99	2230	LLP	VOA
109390-2	/ /				06/26/99	2301	LLP	VOA
109390-3	/ /				06/26/99	2332	LLP	VOA
109390-4	/ /				06/27/99	0003	LLP	VOA
109390-6	/ /				06/27/99	0035	LLP	VOA
109390-9	/ /				06/27/99	0106	LLP	VOA
109390-10	/ /				06/27/99	0137	LLP	VOA
109373-1	/ /				06/27/99	0209	LLP	VOA
109373-2	/ /				06/27/99	0240	LLP	VOA
109373-3	/ /				06/27/99	0311	LLP	VOA
109373-4	/ /				06/27/99	0342	LLP	VOA
109373-5MS	/ /			AKA 109373-4	06/27/99	0414	LLP	VOA
109373-6MSD	/ /			AKA 109373-4	06/27/99	0445	LLP	VOA
109373-7	/ /				06/27/99	0516	LLP	VOA

Analytical Services Inc. Batch QC
For Report Number :109390

QC Batch General Information

Batch Number	Analyte	Analysis Method	Matrix		Blank Result	Prep Metho
48711	Tl	EPA 7841	Aqueous	<	0.0010	
48711	As	EPA 7060	Aqueous	<	0.0050	
48711	Se	EPA 7740	Aqueous	<	0.0300	
48723	Ag	EPA 6010	Aqueous	<	0.0100	
48723	Ba	EPA 6010	Aqueous	<	0.0100	
48723	Be	EPA 6010	Aqueous	<	0.0030	
48723	Cd	EPA 6010	Aqueous	<	0.0050	
48723	Cr	EPA 6010	Aqueous	<	0.0100	
48723	Cu	EPA 6010	Aqueous	<	0.0200	
48723	Ni	EPA 6010	Aqueous	<	0.0200	
48723	Pb	EPA 6010	Aqueous	<	0.0050	
48723	Sb	EPA 6010	Aqueous	<	0.0060	
48723	Zn	EPA 6010	Aqueous	<	0.0200	
49103	Hg	EPA 7470	Aqueous	<	0.0005	
49543	CN	EPA 9014	Aq/Solid	<	0.0200	

Lab Control Information

Batch Number	Analyte	Method	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
48711	Tl	EPA 7841	102	102	0	76 - 124	0 - 2
48711	As	EPA 7060	90	89	1	76 - 124	0 - 2
48711	Se	EPA 7740	98	83	17	76 - 124	0 - 2
48723	Ag	EPA 6010	100	100	0	76 - 124	0 - 2
48723	Ba	EPA 6010	98	96	2	76 - 124	0 - 2
48723	Be	EPA 6010	98	97	1	76 - 124	0 - 2
48723	Cd	EPA 6010	99	97	2	76 - 124	0 - 2
48723	Cr	EPA 6010	100	100	0	76 - 124	0 - 2
48723	Cu	EPA 6010	100	98	2	76 - 124	0 - 2
48723	Ni	EPA 6010	98	96	2	76 - 124	0 - 2
48723	Pb	EPA 6010	100	100	0	76 - 124	0 - 2
48723	Sb	EPA 6010	100	99	1	76 - 124	0 - 2
48723	Zn	EPA 6010	100	99	1	76 - 124	0 - 2
49103	Hg	EPA 7470	91	95	4	76 - 124	0 - 2
49543	CN	EPA 9014	88	85	3	85 - 115	0 - 3

Analytical Services Inc. Batch QC
For Report Number :109390

Matrix Spike Information

Batch Number	Analyte	Method	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
48711	Tl	EPA 7841	74	53	33	65 - 121	0 - 20
48711	As	EPA 7060	63	59	7	25 - 140	0 - 22
48711	Se	EPA 7740	39	44	12	10 - 136	0 - 30
48723	Ag	EPA 6010	95	97	2	56 - 132	0 - 8
48723	Ba	EPA 6010	89	91	2	84 - 103	0 - 7
48723	Be	EPA 6010	88	90	2	85 - 103	0 - 9
48723	Cd	EPA 6010	88	90	2	84 - 102	0 - 8
48723	Cr	EPA 6010	92	94	2	86 - 103	0 - 8
48723	Cu	EPA 6010	92	95	3	81 - 101	0 - 8
48723	Ni	EPA 6010	86	88	2	86 - 101	0 - 7
48723	Pb	EPA 6010	91	93	2	89 - 103	0 - 8
48723	Sb	EPA 6010	83	83	0	83 - 110	0 - 7
48723	Zn	EPA 6010	88	93	6	81 - 107	0 - 11
49103	Hg	EPA 7470	79	87	10	73 - 119	0 - 17
49543	CN	EPA 9014	89	86	3	61 - 118	0 - 13

Post Digestion Spike Information

Batch Number	Analyte	Method	PDS %Rec	%Recovery Range
48711	Tl	EPA 7841	95	76 - 124
48711	As	EPA 7060	97	76 - 124
48711	Se	EPA 7740	116	76 - 124
48723	Ag	EPA 6010	110	76 - 124
48723	Ba	EPA 6010	100	76 - 124
48723	Be	EPA 6010	100	76 - 124
48723	Cd	EPA 6010	100	76 - 124
48723	Cr	EPA 6010	110	76 - 124
48723	Cu	EPA 6010	100	76 - 124
48723	Ni	EPA 6010	100	76 - 124
48723	Pb	EPA 6010	100	76 - 124
48723	Sb	EPA 6010	100	76 - 124
48723	Zn	EPA 6010	120	76 - 124

Unspiked Sample Duplicate Information

Batch Number	Analyte	Method	Sample 1 RPD	Sample 2 RPD	RPD Range
49103	Hg	EPA 7470	20		0 - 1
49543	CN	EPA 9014	5		0 - 1

Sample Batch Information
Analysis : Tl, As, Se

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	I
48711BLANK	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
48711LCS	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
48711LCSD	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109373-5MS	Tl	06/24/99	0905	ELK	AKA 109373-1	06/25/99	1222	DCF	A
109373-6MSD	Tl	06/24/99	0905	ELK	AKA 109373-1	06/25/99	1222	DCF	A
109428-2PDS	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109428-2DUP	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109373-1	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109373-2	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109373-3	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109373-4	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109373-7	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109373-8	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109390-1	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109428-1	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109428-2	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
109428-3	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	A
48711BLANK	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
48711LCS	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
48711LCSD	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109373-5MS	Se	06/24/99	0905	ELK	AKA 109373-1	06/28/99	0927	RCP	A
109373-6MSD	Se	06/24/99	0905	ELK	AKA 109373-1	06/28/99	0927	RCP	A
109428-2PDS	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109428-2DUP	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109373-1	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109373-2	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109373-3	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109373-4	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109373-7	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109373-8	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109390-1	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109428-1	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109428-2	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
109428-3	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	A
48711BLANK	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
48711LCS	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
48711LCSD	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
109373-5MS	As	06/24/99	0905	ELK	AKA 109373-1	06/28/99	1308	RCP	A
109373-6MSD	As	06/24/99	0905	ELK	AKA 109373-1	06/28/99	1308	RCP	A
109428-2PDS	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
109428-2DUP	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
109373-1	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
109373-2	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
109373-3	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
109373-4	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
109373-7	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
109373-8	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A
109390-1	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	A

Q.C. Information for Batch # 48711 For Report Number :109390

Sample Batch Information
Analysis : Tl, As, Se

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	In
109428-1	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109428-2	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109428-3	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA

Q.C. Information for Batch # 48723 For Report Number :109390

Sample Batch Information

Analysis : Ag, Ba, Be, Cd, Cr, Cu, Ni, Pb, Sb, Zn

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	In
48723BLANK		06/25/99	1300	ELK	TRACE	06/28/99	1723	MAB	IC
48723LCS		06/25/99	1300	ELK	TRACE	06/28/99	1727	MAB	IC
48723LCSD		06/25/99	1300	ELK	TRACE	06/28/99	1731	MAB	IC
109373-5MS		06/25/99	1300	ELK	AKA 109373-1	06/28/99	1639	MAB	IC
109373-6MSD		06/25/99	1300	ELK	AKA 109373-1	06/28/99	1643	MAB	IC
109373-7PDS		06/25/99	1300	ELK	TRACE	06/28/99	1736	MAB	IC
109373-8DUP		06/25/99	1300	ELK	TRACE	06/28/99	1740	MAB	IC
109373-1RR		06/25/99	1300	ELK	TRACE	06/28/99	1648	MAB	IC
109373-2RR		06/25/99	1300	ELK	TRACE	06/28/99	1652	MAB	IC
109373-3RR		06/25/99	1300	ELK	TRACE	06/28/99	1656	MAB	IC
109373-4RR		06/25/99	1300	ELK	TRACE	06/28/99	1701	MAB	IC
109373-7RR		06/25/99	1300	ELK	TRACE	06/28/99	1705	MAB	IC
109373-8RR		06/25/99	1300	ELK	TRACE	06/28/99	1709	MAB	IC
109390-1RR		06/25/99	1300	ELK	TRACE	06/28/99	1744	MAB	IC
109428-1RR		06/25/99	1300	ELK	TRACE	06/28/99	1749	MAB	IC
109428-2RR		06/25/99	1300	ELK	TRACE	06/28/99	1753	MAB	IC
109428-3RR		06/25/99	1300	ELK	TRACE	06/28/99	1758	MAB	IC

Sample Batch Information
Analysis : Hg

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	In
49103BLANK	Hg	06/25/99	0935	MLR	AQU	06/25/99	1359	MLR	HG
49103LCS	Hg	06/25/99	0935	MLR	AQU	06/25/99	1402	MLR	HG
49103LCSD	Hg	06/25/99	0935	MLR	AQU	06/25/99	1404	MLR	HG
109373-5MS	Hg	06/25/99	0935	MLR	AKA 109373-1	06/25/99	1407	MLR	HG
109373-6MSD	Hg	06/25/99	0935	MLR	AKA 109373-1	06/25/99	1409	MLR	HG
109373-6DUP	Hg	06/25/99	0935	MLR	AKA 109373-1	06/25/99	1412	MLR	HG
109373-1	Hg	06/25/99	0935	MLR	AQU	06/25/99	1414	MLR	HG
109373-2	Hg	06/25/99	0935	MLR	AQU	06/25/99	1417	MLR	HG
109373-3	Hg	06/25/99	0935	MLR	AQU	06/25/99	1419	MLR	HG
109373-4	Hg	06/25/99	0935	MLR	AQU	06/25/99	1422	MLR	HG
109373-5	Hg	06/25/99	0935	MLR	AQU	06/25/99	1430	MLR	HG
109373-6	Hg	06/25/99	0935	MLR	AQU	06/25/99	1432	MLR	HG
109373-7	Hg	06/25/99	0935	MLR	AQU	06/25/99	1435	MLR	HG
109373-8	Hg	06/25/99	0935	MLR	AQU	06/25/99	1437	MLR	HG
109390-1	Hg	06/25/99	0935	MLR	AQU	06/25/99	1439	MLR	HG
109428-2	Hg	06/25/99	0935	MLR	AQU	06/25/99	1444	MLR	HG
109428-3	Hg	06/25/99	0935	MLR	AQU	06/25/99	1447	MLR	HG
109428-1	Hg	06/25/99	0935	MLR	AQU	06/25/99	1442	MLR	HG

Q.C. Information for Batch # 49543 For Report Number :109390

Sample Batch Information
Analysis : CN

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Ins
49543BLK		06/25/99	1010	HH	MIDI-DIST	06/25/99	1010	HH	GEN
49543LCS		06/25/99	1010	HH	MIDI-DIST	06/25/99	1010	HH	GEN
49543LCSD		06/25/99	1010	HH	MIDI-DIST	06/25/99	1010	HH	GEN
109390-1		06/25/99	1010	HH	MIDI-DIST	06/25/99	1010	HH	GEN
109390-5		06/25/99	1010	HH	MIDI-DIST	06/25/99	1010	HH	GEN
109390-7		06/25/99	1010	HH	MIDI-DIST	06/25/99	1010	HH	GEN
109390-7DUP		06/25/99	1010	HH	MIDI-DIST	06/25/99	1010	HH	GEN
109390-1MS		06/25/99	1600	HH	MIDI-DIST	06/26/99	1230	HH	GEN
109390-1MSD		06/25/99	1600	HH	MIDI-DIST	06/26/99	1230	HH	GEN

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

ASI II 109390 V 6 5.3 C1

Laboratory Task Order No. 09619

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number TF0003200016

Project Location SLOSS INDUSTRIES / BHAM

Laboratory ASI

Sampler(s)/Affiliation JASON KIRKPATRICK
AARON STEARNS

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	VOC's (EPA 8260) 40 mL VOA vials HCL on ice a-c	SVOC's (EPA 8270) 1 liter Amber Glass no pres. / on ice d,e	CYANIDE (9010) 950 mL plastic w/ NaOH / on ice f	PP Metals + Barium 500 mL plastic w/ HNO3 / on ice g	MERCURY (7470) 500 mL clear glass w/ HNO3 / on ice h	TEMP. BLANK				TOTAL
0618-BT-13-GW0040	L	6/16/99 1315		3	2	1	1	1			-1	~~-1~~	8
~~0618-CM-00-EB~~ BLK	~~—~~											~~-2~~	6-19-99
0618-CM-00-GW00P13D		1530		3							-2	~~-3~~	3
0618-CM-00-GW00P13S		1550		3							-3	~~-4~~	3
0618-LD-39-GW0034D		1700		3							-4	~~-5~~	3
0618-LD-39-GW0034S		1710				1					-5	~~-6~~	1
0618-BT-13-TB0002		—		2							-6	~~-7~~	2
TEMP									1				1

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 21

Relinquished by: [signature]	Organization: ARCADIS Geraghty + Miller	Date 6/18/99	Time 1900	Seal Intact? Yes No N/A (Yes)
Received by: [signature]	Organization: ASI	Date 6/19/99	Time 0909	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks:
TEMP · 2°C @ 0911 ice, seal intact, thermo = 1C (7:10), pH = (12) CN, 1 (Met)

ASI # 109390 V 6 S.S C\

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

Laboratory Task Order No. 09619

CHAIN-OF-CUSTODY RECORD

Project Number TF000320.0016

Project Location Sloss Industries / B-HAM

Laboratory ASI

Sampler(s)/Affiliation Aaron Stearns
Jason Kirkpatrick

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	VOC's (EPA 8260) 40mL VOA vials HCL on ice 9-C	Cyanide (9010) 950mL plastic w/NaOH on ice						Temperature Blank		TOTAL
019- LD-39-GW0032	L	6/19/99 1235			1						-7	~~-8~~	1
019- LD-38-GW0026	L	1250		3 *							-8	~~-9~~	3
019- FW-00-GW00P1S	L	1325		3							-9	~~-10~~	3
019- LD-38-TB0003	L	—		2							-10	~~-11~~	2
Temp. Blank											1		1

*No HCL for preservative - had to rinse out.

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/ Containers 10

Relinquished by: Aaron Stearns	Organization: ARCADIS Geraghty + Miller	Date 6/19/99	Time 1500	Seal Intact?
Received by: [signature]	Organization: ASI	Date 6/19/99	Time 17:10	Yes No N/A
Relinquished by:	Organization:	Date / /	Time	Seal Intact?
Received by:	Organization:	Date / /	Time	Yes No N/A

Special Instructions/Remarks:

Please note: 990619-LD-38-GW0026 DOES NOT have HCL for preservative — 7 DAY HOLD TIME!

ASI

ANALYTICAL SERVICES, INC.

ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS

110 TECHNOLOGY PARKWAY • NORCROSS, GA 30092
(770) 734-4200 • FAX (770) 734-4201

ARCADIS Geraghty & Miller, Inc.
Project Name: Sloss Industries
Project Number: TF0003200016
ASI Report #109373

ASI Sample ID	ARCADIS Sample ID	Analysis	Notes
109373-1	990617-BT-13-GW0041	CN, Metals, 8260, 8270	
109373-2	990617-BT-13-GW0042	CN, Metals, 8260, 8270	
109373-3	990617-BT-13-GW0043	CN, Metals, 8260, 8270	
109373-4	990617-BT-13-GW9041	CN, Metals, 8260, 8270	
109373-5	990617-BT-13-GW0041MS	CN, Metals, 8260, 8270	Lab QA Sample
109373-6	990617-BT-13-GW0041MSD	CN, Metals, 8260, 8270	Lab QA Sample
109373-7	990617-BT-13-FB0001	CN, Metals, 8260, 8270	
109373-8	990617-BT-13-GWEB01	CN, Metals, 8260, 8270	
109373-9	990617-BT-13-TB001	8260	

ASI

ANALYTICAL SERVICES, INC.

ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS

110 TECHNOLOGY PARKWAY • NORCROSS GA 30092

(770) 734-4200 • (770) 734-4201 FAX

6 July, 1999

Case Narrative ASI Sample 109373

Nine aqueous samples were collected on 17 June, 1999 and arrived at ASI on 18 June, 1999. All conditions for proper preservation and shipment were met. The samples were logged into LIMS as ASI sample 109373 for aqueous analysis of BNA, VOC, metals, and cyanide. Sample 109373-5MS and 109373-6MSD are also known as 109373-4. All holding times were met.

Base neutrals/acids were analyzed in batch 49282 using EPA method 8270. The MS RPD for phenol was high. Sample 109373-5MS was reextracted and reanalyzed due analyst oversight. All other measurement quality objectives were met.

Volatile organics were analyzed in batches 49357/49546 using EPA method 8260. All measurement quality objectives were met in both batches.

Mercury was analyzed in batch 49103 using EPA method 7470. The sample duplicate RPD was slightly high. All other measurement quality objectives for mercury were met. Thallium, arsenic, and selenium were analyzed in batch 48711 using EPA methods 7841, 7060, 7740, respectively. The MS RPD for thallium was low due to a low MSD recovery. All other measurement quality objectives were met. ICP metals were analyzed in batch 48723 using EPA method 6010. All measurement quality objectives were met.

Cyanide was analyzed in batch 49540 using EPA method 9014. All measurement quality objectives were met.

Respectfully yours,

Jon Neuhaus

Quality Assurance

ASI ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109373-1**

August 4, 199

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0041, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	General Chemistry					
57125	Total Cyanide	0.26	0.02	mg/L	1	EPA 9014
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	BDL	0.01	mg/L	1	EPA 7060A
7440393	Total Barium	0.20	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	BDL	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	BDL	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	BDL	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	0.02	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	0.028	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	0.002	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	BDL	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	BDL	0.04	mg/L	1	EPA 7740
7440224	Total Silver	BDL	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	BDL	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	0.17	0.02	mg/L	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260
75252	Bromoform	BDL	5	ug/L	1	EPA 8260
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260
67663	Chloroform	BDL	5	ug/L	1	EPA 8260
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260

BDL - Below Detection Limit

Report No.: **109373-1** August 4, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0041, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	BDL	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	10	ug/L	1	EPA 8270C
95578	2-Chlorophenol	BDL	10	ug/L	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270C
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270C
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270C
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270C
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270C
100027	4-Nitrophenol	BDL	50	ug/L	1	EPA 8270C
87865	Pentachlorophenol	BDL	10	ug/L	1	EPA 8270C
108952	Phenol	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0041, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	39	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	25	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	23	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	23	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	21	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	13	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	29	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	26	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	17	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270C
206440	Fluoranthene	140	10	ug/L	1	EPA 8270C
86737	Fluorene	31	10	ug/L	1	EPA 8270C
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270C
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	15	10	ug/L	1	EPA 8270C
78591	Isophorone	BDL	10	ug/L	1	EPA 8270C
91576	2-Methylnaphthalene	33	10	ug/L	1	EPA 8270C
91203	Naphthalene	84	10	ug/L	1	EPA 8270C
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: **109373-1** August 4, 19

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0041, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270
621647	N-Nitrosodi-n-propylamine	BDL	10	ug/L	1	EPA 8270
85018	Phenanthrene	120	10	ug/L	1	EPA 8270
129000	Pyrene	69	10	ug/L	1	EPA 8270
110861	Pyridine	BDL	10	ug/L	1	EPA 8270
120821	1,2,4-Trichlorobenzene	BDL	10	ug/L	1	EPA 8270

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI
ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109373-2**

August 4, 1999

Sample Description
Sloss Industries
Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0042, 06/17/99, 15:40, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
		General Chemistry				
57125	Total Cyanide	0.12	0.02	mg/L	1	EPA 9014
		Priority Pollutant Metals				
		Metals				
7440360	Total Antimony	BDL	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	0.01	0.01	mg/L	1	EPA 7060A
440393	Total Barium	0.22	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	BDL	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	BDL	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	BDL	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	0.02	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	BDL	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	BDL	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	BDL	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	BDL	0.04	mg/L	1	EPA 7740
7440224	Total Silver	BDL	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	BDL	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	0.10	0.02	mg/L	1	EPA 6010A
		Volatile Organics (EPA 8260B)				
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0042, 06/17/99, 15:40, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	BDL	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	10	ug/L	1	EPA 8270C
95578	2-Chlorophenol	BDL	10	ug/L	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270C
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270C
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270C
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270C
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270C
100027	4-Nitrophenol	BDL	50	ug/L	1	EPA 8270C
87865	Pentachlorophenol	BDL	10	ug/L	1	EPA 8270C
108952	Phenol	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: 109373-2 August 4, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0042, 06/17/99, 15:40, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	BDL	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	BDL	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	BDL	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270C
206440	Fluoranthene	BDL	10	ug/L	1	EPA 8270C
86737	Fluorene	BDL	10	ug/L	1	EPA 8270C
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270C
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	10	ug/L	1	EPA 8270C
78591	Isophorone	BDL	10	ug/L	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	10	ug/L	1	EPA 8270C
91203	Naphthalene	BDL	10	ug/L	1	EPA 8270C
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: 109373-2 August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0042, 06/17/99, 15:40, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270C
621647	N-Nitrosodi-n-propylamine	BDL	10	ug/L	1	EPA 8270C
85018	Phenanthrene	BDL	10	ug/L	1	EPA 8270C
129000	Pyrene	BDL	10	ug/L	1	EPA 8270C
110861	Pyridine	BDL	10	ug/L	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	10	ug/L	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109373-3**

August 4, 199

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0043, 06/17/99, 12:10, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
		General Chemistry				
57125	Total Cyanide	BDL	0.02	mg/L	1	EPA 9014
		Priority Pollutant Metals				
		Metals				
7440360	Total Antimony	BDL	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	0.01	0.01	mg/L	1	EPA 7060A
7440393	Total Barium	0.12	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	BDL	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	BDL	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	BDL	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	BDL	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	BDL	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	BDL	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	BDL	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	BDL	0.04	mg/L	1	EPA 7740
7440224	Total Silver	BDL	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	BDL	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	0.07	0.02	mg/L	1	EPA 6010A
		Volatile Organics (EPA 8260B)				
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260
67663	Chloroform	BDL	5	ug/L	1	EPA 8260
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260

BDL - Below Detection Limit

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0043, 06/17/99, 12:10, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	BDL	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	10	ug/L	1	EPA 8270C
95578	2-Chlorophenol	BDL	10	ug/L	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270C
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270C
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270C
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270C
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270C
100027	4-Nitrophenol	BDL	50	ug/L	1	EPA 8270C
87865	Pentachlorophenol	BDL	10	ug/L	1	EPA 8270C
108952	Phenol	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: **109373-3** August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0043, 06/17/99, 12:10, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	BDL	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	BDL	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	BDL	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270C
206440	Fluoranthene	BDL	10	ug/L	1	EPA 8270C
86737	Fluorene	BDL	10	ug/L	1	EPA 8270
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270
193395	Indeno(1,2,3-cd)pyrene	BDL	10	ug/L	1	EPA 8270
78591	Isophorone	BDL	10	ug/L	1	EPA 8270
91576	2-Methylnaphthalene	BDL	10	ug/L	1	EPA 8270
91203	Naphthalene	BDL	10	ug/L	1	EPA 8270
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 8270
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 8270

BDL - Below Detection Limit

Report No.: **109373-3** August 4, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW0043, 06/17/99, 12:10, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270C
621647	N-Nitrosodi-n-propylamine	BDL	10	ug/L	1	EPA 8270C
85018	Phenanthrene	BDL	10	ug/L	1	EPA 8270C
129000	Pyrene	BDL	10	ug/L	1	EPA 8270C
110861	Pyridine	BDL	10	ug/L	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	10	ug/L	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109373-4**

August 4, 199

Sample Description
Sloss Industries
Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041, 06/17/99,, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	General Chemistry					
57125	Total Cyanide	0.25	0.02	mg/L	1	EPA 9014
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	BDL	0.01	mg/L	1	EPA 7060A
7440393	Total Barium	0.19	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	BDL	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	BDL	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	BDL	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	BDL	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	0.023	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	0.001	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	BDL	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	BDL	0.04	mg/L	1	EPA 7740
7440224	Total Silver	BDL	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	BDL	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	0.12	0.02	mg/L	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	6	5	ug/L	1	EPA 8260
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260
75252	Bromoform	BDL	5	ug/L	1	EPA 8260
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260
67663	Chloroform	BDL	5	ug/L	1	EPA 8260
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260

BDL - Below Detection Limit

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041, 06/17/99,, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260E
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260E
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260E
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260E
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260E
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260E
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260E
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260E
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260E
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260E
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260E
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260E
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260E
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260E
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260E
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260E
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260E
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260E
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260E
100425	Styrene	BDL	5	ug/L	1	EPA 8260E
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260E
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260E
108883	Toluene	BDL	2	ug/L	1	EPA 8260E
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260I
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260I
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260I
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260I
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	10	ug/L	1	EPA 8270
95578	2-Chlorophenol	BDL	10	ug/L	1	EPA 8270
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270
100027	4-Nitrophenol	BDL	50	ug/L	1	EPA 8270
87865	Pentachlorophenol	BDL	10	ug/L	1	EPA 8270
108952	Phenol	BDL	10	ug/L	1	EPA 8270

BDL - Below Detection Limit

Report No.: **109373-4** August 4, 19

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041, 06/17/99,, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	36	10	ug/L	1	EPA 8270
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270
120127	Anthracene	25	10	ug/L	1	EPA 8270
56553	Benzo(a)anthracene	23	10	ug/L	1	EPA 8270
205992	Benzo(b)fluoranthene	23	10	ug/L	1	EPA 8270
207089	Benzo(k)fluoranthene	29	10	ug/L	1	EPA 8270
191242	Benzo(g,h,i)perylene	14	10	ug/L	1	EPA 8270
50328	Benzo(a)pyrene	28	10	ug/L	1	EPA 8270
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270
218019	Chrysene	25	10	ug/L	1	EPA 8270
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270
132649	Dibenzofuran	16	10	ug/L	1	EPA 8270
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 827
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 827
106467	1,4-Dichlorobenzene	BDL	10	ug/L	1	EPA 827
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 827
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 827
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 827
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 827
121142	2,4-Dinitrotoluene	BDL	10	ug/L	1	EPA 827
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 827
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 827
206440	Fluoranthene	140	10	ug/L	1	EPA 827
86737	Fluorene	30	10	ug/L	1	EPA 827
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 827
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 827
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 827
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 827
193395	Indeno(1,2,3-cd)pyrene	14	10	ug/L	1	EPA 827
78591	Isophorone	BDL	10	ug/L	1	EPA 827
91576	2-Methylnaphthalene	29	10	ug/L	1	EPA 827
91203	Naphthalene	65	10	ug/L	1	EPA 827
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 827
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 827

BDL - Below Detection Limit

Report No.: **109373-4** August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041, 06/17/99,, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270C
621647	N-Nitrosodi-n-propylamine	BDL	10	ug/L	1	EPA 8270C
85018	Phenanthrene	120	10	ug/L	1	EPA 8270C
129000	Pyrene	73	10	ug/L	1	EPA 8270C
110861	Pyridine	BDL	10	ug/L	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	10	ug/L	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis

110 Technology Parkway Norcross, GA 30092

(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin

Report No.: **109373-5**

August 4, 19

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041 MS, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
	General Chemistry					
57125	Total Cyanide	0.42	0.02	mg/L	1	EPA 9014
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	0.83	0.006	mg/L	1	EPA 6010
7440382	Total Arsenic	0.06	0.01	mg/L	1	EPA 7060
7440393	Total Barium	3.8	0.01	mg/L	1	EPA 6010
7440417	Total Beryllium	0.44	0.004	mg/L	1	EPA 6010
7440439	Total Cadmium	0.18	0.005	mg/L	1	EPA 6010
7440473	Total Chromium	0.37	0.01	mg/L	1	EPA 6010
7440508	Total Copper	0.49	0.02	mg/L	1	EPA 6010
7439921	Total Lead	1.8	0.015	mg/L	1	EPA 6010
7439976	Total Mercury	0.003	0.0005	mg/L	1	EPA 747
7440020	Total Nickel	0.87	0.02	mg/L	1	EPA 6010
7782492	Total Selenium	0.04	0.04	mg/L	1	EPA 774
7440224	Total Silver	0.95	0.01	mg/L	1	EPA 6010
7440280	Total Thallium	0.06	0.002	mg/L	1	EPA 784
7440666	Total Zinc	1.1	0.02	mg/L	1	EPA 6010
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 826
107028	Acrolein	BDL	50	ug/L	1	EPA 826
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 826
71432	Benzene	52	5	ug/L	1	EPA 826
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 826
75252	Bromoform	BDL	5	ug/L	1	EPA 826
74839	Bromomethane	BDL	10	ug/L	1	EPA 826
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 826
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 826
108907	Chlorobenzene	48	5	ug/L	1	EPA 826
75003	Chloroethane	BDL	5	ug/L	1	EPA 826
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 826
67663	Chloroform	BDL	5	ug/L	1	EPA 826
74873	Chloromethane	BDL	10	ug/L	1	EPA 826

BDL - Below Detection Limit

Report No.: **109373-5** August 4, 19

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041 MS, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260
75354	1,1-Dichloroethene	39	5	ug/L	1	EPA 8260
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260
100425	Styrene	BDL	5	ug/L	1	EPA 8260
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260
108883	Toluene	46	2	ug/L	1	EPA 8260
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260
79016	Trichloroethene	47	2	ug/L	1	EPA 8260
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	67	10	ug/L	1	EPA 8270
95578	2-Chlorophenol	51	10	ug/L	1	EPA 8270
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270
100027	4-Nitrophenol	32J	50	ug/L	1	EPA 827
87865	Pentachlorophenol	77	10	ug/L	1	EPA 827
108952	Phenol	25	10	ug/L	1	EPA 827

BDL - Below Detection Limit

Report No.: **109373-5** August 4, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041 MS, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	14	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	BDL	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	BDL	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	BDL	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	26	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	40	10	ug/L	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270C
206440	Fluoranthene	BDL	10	ug/L	1	EPA 8270C
86737	Fluorene	BDL	10	ug/L	1	EPA 8270C
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270C
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	10	ug/L	1	EPA 8270C
78591	Isophorone	BDL	10	ug/L	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	10	ug/L	1	EPA 8270C
91203	Naphthalene	BDL	10	ug/L	1	EPA 8270C
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: **109373-5** August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041 MS, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270C
621647	N-Nitrosodi-n-propylamine	34	10	ug/L	1	EPA 8270C
85018	Phenanthrene	BDL	10	ug/L	1	EPA 8270C
129000	Pyrene	20	10	ug/L	1	EPA 8270C
110861	Pyridine	BDL	10	ug/L	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	31	10	ug/L	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI
ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109373-6**

August 4, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041 MSD, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	General Chemistry					
57125	Total Cyanide	0.42	0.02	mg/L	1	EPA 9014
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	0.83	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	0.05	0.01	mg/L	1	EPA 7060A
7440393	Total Barium	3.8	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	0.45	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	0.18	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	0.38	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	0.50	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	1.9	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	0.004	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	0.90	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	0.04	0.04	mg/L	1	EPA 7740
7440224	Total Silver	0.97	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	0.04	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	1.1	0.02	mg/L	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	57	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	53	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Report No.: 109373-6

August 4, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041 MSD, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	45	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	50	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	51	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	64	10	ug/L	1	EPA 8270C
95578	2-Chlorophenol	43	10	ug/L	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270C
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270C
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270C
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270C
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270C
100027	4-Nitrophenol	31J	50	ug/L	1	EPA 8270C
87865	Pentachlorophenol	79	10	ug/L	1	EPA 8270C
108952	Phenol	21	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: 109373-6 August 4, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041 MSD, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	14	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	BDL	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	BDL	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	BDL	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	20	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	40	10	ug/L	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270C
206440	Fluoranthene	BDL	10	ug/L	1	EPA 8270C
86737	Fluorene	BDL	10	ug/L	1	EPA 8270C
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270C
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	10	ug/L	1	EPA 8270C
78591	Isophorone	BDL	10	ug/L	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	10	ug/L	1	EPA 8270C
91203	Naphthalene	BDL	10	ug/L	1	EPA 8270C
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: **109373-6** August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GW9041 MSD, 06/17/99, 13:45, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270C
621647	N-Nitrosodi-n-propylamine	27	10	ug/L	1	EPA 8270C
85018	Phenanthrene	BDL	10	ug/L	1	EPA 8270C
129000	Pyrene	6J	10	ug/L	1	EPA 8270C
110861	Pyridine	BDL	10	ug/L	1	EPA 8270C
120821	1;2,4-Trichlorobenzene	26	10	ug/L	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109373-7**

August 4, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF0003200016, 990617-BT-13-FB0001, 06/17/99, 11:20, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	General Chemistry					
57125	Total Cyanide	BDL	0.02	mg/L	1	EPA 9014
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	BDL	0.01	mg/L	1	EPA 7060A
7440393	Total Barium	BDL	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	BDL	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	BDL	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	BDL	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	BDL	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	BDL	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	BDL	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	BDL	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	BDL	0.04	mg/L	1	EPA 7740
7440224	Total Silver	BDL	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	BDL	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	0.08	0.02	mg/L	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-FB0001, 06/17/99, 11:20, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	BDL	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	10	ug/L	1	EPA 8270C
95578	2-Chlorophenol	BDL	10	ug/L	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270C
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270
100027	4-Nitrophenol	BDL	50	ug/L	1	EPA 8270
87865	Pentachlorophenol	BDL	10	ug/L	1	EPA 8270
108952	Phenol	BDL	10	ug/L	1	EPA 8270

BDL - Below Detection Limit

Report No.: **109373-7** August 4, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-FB0001, 06/17/99, 11:20, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	BDL	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	BDL	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	BDL	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270C
206440	Fluoranthene	BDL	10	ug/L	1	EPA 8270C
86737	Fluorene	BDL	10	ug/L	1	EPA 8270C
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270C
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	10	ug/L	1	EPA 8270C
78591	Isophorone	BDL	10	ug/L	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	10	ug/L	1	EPA 8270C
91203	Naphthalene	BDL	10	ug/L	1	EPA 8270C
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: 109373-7 August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-FB0001, 06/17/99, 11:20, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270C
621647	N-Nitrosodi-n-propylamine	BDL	10	ug/L	1	EPA 8270C
85018	Phenanthrene	BDL	10	ug/L	1	EPA 8270C
129000	Pyrene	BDL	10	ug/L	1	EPA 8270C
110861	Pyridine	BDL	10	ug/L	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	10	ug/L	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

A N A L Y T I C A L   S E R V I C E S, I N C .

Environmental Monitoring & Laboratory Analysis

110 Technology Parkway Norcross, GA 30092

(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin

Report No.: **109373-8**

August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GWEB01, 06/17/99, 11:30, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
			General Chemistry			
57125	Total Cyanide	BDL	0.02	mg/L	1	EPA 9014
			Priority Pollutant Metals			
			Metals			
7440360	Total Antimony	BDL	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	BDL	0.01	mg/L	1	EPA 7060A
7440393	Total Barium	BDL	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	BDL	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	BDL	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	BDL	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	BDL	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	BDL	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	BDL	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	BDL	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	BDL	0.04	mg/L	1	EPA 7740
7440224	Total Silver	BDL	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	BDL	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	0.09	0.02	mg/L	1	EPA 6010A
			Volatile Organics (EPA 8260B)			
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260
67663	Chloroform	BDL	5	ug/L	1	EPA 8260
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260

BDL - Below Detection Limit

Report No.: 109373-8 August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GWEB01, 06/17/99, 11:30, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260E
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260E
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260E
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260E
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260E
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260E
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260E
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260E
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260E
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260E
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260E
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260E
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260E
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260E
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260E
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260E
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260E
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260E
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260E
100425	Styrene	BDL	5	ug/L	1	EPA 8260E
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260E
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260E
108883	Toluene	BDL	2	ug/L	1	EPA 8260E
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260E
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260E
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260E
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260E
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260E
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260I
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260I
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260I
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	10	ug/L	1	EPA 8270
95578	2-Chlorophenol	BDL	10	ug/L	1	EPA 8270
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270
100027	4-Nitrophenol	BDL	50	ug/L	1	EPA 827C
87865	Pentachlorophenol	BDL	10	ug/L	1	EPA 827C
108952	Phenol	BDL	10	ug/L	1	EPA 827C

BDL - Below Detection Limit

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GWEB01, 06/17/99, 11:30, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	BDL	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	BDL	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	BDL	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270
206440	Fluoranthene	BDL	10	ug/L	1	EPA 8270
86737	Fluorene	BDL	10	ug/L	1	EPA 8270
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270
193395	Indeno(1,2,3-cd)pyrene	BDL	10	ug/L	1	EPA 827C
78591	Isophorone	BDL	10	ug/L	1	EPA 827C
91576	2-Methylnaphthalene	BDL	10	ug/L	1	EPA 827C
91203	Naphthalene	BDL	10	ug/L	1	EPA 827C
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 827C
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 827C

BDL - Below Detection Limit

Report No.: **109373-8** August 4, 19

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-GWEB01, 06/17/99, 11:30, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270
621647	N-Nitrosodi-n-propylamine	BDL	10	ug/L	1	EPA 8270
85018	Phenanthrene	BDL	10	ug/L	1	EPA 8270
129000	Pyrene	BDL	10	ug/L	1	EPA 8270
110861	Pyridine	BDL	10	ug/L	1	EPA 8270
120821	1,2,4-Trichlorobenzene	BDL	10	ug/L	1	EPA 8270

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI
ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109373-9**

August 4, 19

Sample Description
Sloss Industries
Water, Birmingham, Project #TF0003200016, 990617-BT-13-TB001, 06/17/99,, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytica Method
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260
107028	Acrolein	BDL	50	ug/L	1	EPA 8260
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260
71432	Benzene	BDL	5	ug/L	1	EPA 8260
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260
75252	Bromoform	BDL	5	ug/L	1	EPA 8260
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260
67663	Chloroform	BDL	5	ug/L	1	EPA 8260
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 826
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 826
591786	2-Hexanone	BDL	50	ug/L	1	EPA 826
74884	Iodomethane	BDL	5	ug/L	1	EPA 826
78933	2-Butanone	BDL	50	ug/L	1	EPA 826

BDL - Below Detection Limit

Report No.: 109373-9 August 4, 199

Sample Description

Sloss Industries

Water, Birmingham, Project #TF0003200016, 990617-BT-13-TB001, 06/17/99,, received 06/18/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	BDL	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

Analytical Services Inc. Batch QC
For Report Number :109373
Base Neutrals / Acids

Matrix : Aqueous　　Batch # 49282　　Method : EPA 8270

Lab Control Information Analyte	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
Phenol	29	27	5	12 - 89	0 - 42
2-Chlorophenol	67	56	17	27 - 123	0 - 40
1,4-Dichlorobenzene	51	39	27	36 - 97	0 - 28
N-Nitrosodipropylamine	88	71	21	41 - 116	0 - 38
1,2,4-Trichlorobenzene	64	49	27	44 - 142	0 - 28
4-Chloro-3-methylphenol	87	78	11	23 - 97	0 - 42
Acenaphthene	84	67	23	46 - 118	0 - 31
2,4-Dinitrotoluene	80	74	7	24 - 96	0 - 38
4-Nitrophenol	25	24	2	10 - 80	0 - 50
Pentachlorophenol	95	83	14	9 - 103	0 - 50
Pyrene	103	93	10	26 - 127	0 - 31

Matrix Spike Information Analyte	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
Phenol	51	29	54	15 - 64	0 - 32
2-Chlorophenol	75	54	32	36 - 87	0 - 35
1,4-Dichlorobenzene	59	47	23	31 - 83	0 - 31
N-Nitrosodipropylamine	92	78	17	42 - 108	0 - 33
1,2,4-Trichlorobenzene	72	63	13	35 - 96	0 - 33
4-Chloro-3-methylphenol	92	76	19	35 - 99	0 - 26
Acenaphthene	91	77	17	47 - 113	0 - 28
2,4-Dinitrotoluene	85	77	9	34 - 109	0 - 30
4-Nitrophenol	54	37	37	6 - 69	0 - 44
Pentachlorophenol	100	105	5	12 - 106	0 - 44
Pyrene	107	103	4	55 - 133	0 - 28

Analytical Services Inc. Batch QC
Surrogate Recovery
Base Neutrals / Acids

Matrix : Aqueous
Batch # 49282
Method : EPA 8270

% Recovery Objectives

S1	2-Fluorophenol	21 - 100
S2	Phenol-d5	10 - 94
S3	Nitrobenzene-d5	35 - 114
S4	2-Fluorobiphenyl	43 - 116
S5	2,4,6-Tribromophenol	10 - 123
S6	Terphenyl-d14	33 - 141

Sample	File	S1	S2	S3	S4	S5	S6
49282BLK	B3118	30	19	62	62	83	86
49282LCS	B3119	37	27	78	81	106	97
49282LCSD	B3120	39	26	63	62	96	87
109119-10MS	B3121	64	50	85	88	111	98
109119-10MSD	B3122	38	28	72	74	98	93
109119-10	B3123	40	28	76	80	101	98
109119-11	B3124	41	25	75	73	88	95
108995-14	B3125	31	21	60	59	73	80
108995-15	B3126	32	24	71	71	84	87
109373-3DUP	B3347	30	22	68	72	121	72
109373-4	B3351	32	23	74	67	91	67
109373-3	B3350	36	25	79	88	119	74
109373-5	B3352	30	23	73	65	91	73
109373-6	B3353	30	22	73	61	88	78
109373-7	B3354	38	25	81	72	96	91
109373-8	B3355	33	23	73	66	83	99
109428-1	B3356	28	19	57	54	93	90
109428-2	B3357	30	20	52	53	101	74
109428-3	B3358	39	24	76	67	111	70
109390-1	B3346	38	24	71	68	111	79
109428-2D	A8085	27	21	50	74	81	91
^^Note: 1:10 DILUTION							
109373-1	B3348	29	22	68	61	88	62
109373-2	B3349	34	23	76	74	113	79
DAYBL06/23	A8099	50	33	78	86	78	76
DAYBL06/14	B3053	66	50	81	82	89	94
DAYBL06/01	A7770	35	26	70	67	66	89
DAYBL06/22	A8076	38	25	70	73	77	82
109373-5MS	A8209	34	25	64	69	72	59
109373-6MSD	A8210	28	23	56	68	82	69
109373-5MSRR	A8219	35	26	67	76	80	77

Q.C. Information for Batch # 49282 Printed: 08/04/99 18:48:13

Blank Results Information

Base Neutrals / Acids Method : EPA 8270

Analyte	Blank Result	Detection Limit
4-Chloro-3-methylphenol	BDL	10
2-Chlorophenol	BDL	10
2,4-Dichlorophenol	BDL	10
2,6-Dichlorophenol	BDL	10
2,4-Dimethylphenol	BDL	10
2-Methyl-4,6-dinitrophenol	BDL	50
2,4-Dinitrophenol	BDL	50
2-Methylphenol	BDL	10
3-Methylphenol	BDL	10
4-Methylphenol	BDL	10
2-Nitrophenol	BDL	10
4-Nitrophenol	BDL	50
Pentachlorophenol	BDL	10
Phenol	BDL	10
2,4,5-Trichlorophenol	BDL	10
2,4,6-Trichlorophenol	BDL	10
2,3,4,6-Tetrachlorophenol	BDL	10
Acenaphthene	BDL	10
Acenaphthylene	BDL	10
Anthracene	BDL	10
Benzo(a)anthracene	BDL	10
Benzo(b)fluoranthene	BDL	10
Benzo(k)fluoranthene	BDL	10
Benzo(g,h,i)perylene	BDL	10
Benzo(a)pyrene	BDL	10
Benzyl Alcohol	BDL	10
Bis(2-chloroethoxy)methane	BDL	10
Bis(2-chloroethyl)ether	BDL	10
Bis(2-chloroisopropyl)ether	BDL	10
Bis(2-ethylhexyl)phthalate	BDL	10
4-Bromophenyl phenyl ether	BDL	10
p-Chloroaniline	BDL	10
2-Chloronaphthalene	BDL	10
4-Chlorophenyl phenyl ether	BDL	10
Chrysene	BDL	10
Dibenz(a,h)anthracene	BDL	10
Dibenzofuran	BDL	10
Di-n-butylphthalate	BDL	10
1,3-Dichlorobenzene	BDL	10
1,4-Dichlorobenzene	BDL	10
1,2-Dichlorobenzene	BDL	10
3,3'-Dimethylbenzidine	BDL	100
Diethylphthalate	BDL	10
Dimethylphthalate	BDL	10
2,4-Dinitrotoluene	BDL	10
2,6-Dinitrotoluene	BDL	10
Di-n-octylphthalate	BDL	10
Fluoranthene	BDL	10
Fluorene	BDL	10

Q.C. Information for Batch # 49282   Printed: 08/04/99 18:48:13

Blank Results Information
Base Neutrals / Acids   Method : EPA 8270

Analyte	Blank Result	Detection Limit
Hexachlorobenzene	BDL	10
Hexachlorobutadiene	BDL	10
Hexachlorocyclopentadiene	BDL	10
Hexachloroethane	BDL	2
Indeno(1,2,3-cd)pyrene	BDL	10
Isophorone	BDL	10
2-Methylnaphthalene	BDL	10
Naphthalene	BDL	10
2-Nitroaniline	BDL	10
3-Nitroaniline	BDL	10
4-Nitroaniline	BDL	10
Nitrobenzene	BDL	10
N-Nitrosodimethylamine	BDL	10
N-Nitrosodi-n-propylamine	BDL	10
Phenanthrene	BDL	10
Pyrene	BDL	10
Pyridine	BDL	10
1,2,4-Trichlorobenzene	BDL	10

Q.C. Information for Batch # 49282 Printed: 08/04/99 18:48:13

Sample Batch Information
Base Neutrals / Acids Method : EPA 8270

Sample ID	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Ins
49282BLK	06/15/99	1100	SVOA		06/16/99	1627	RAC	597
49282LCS	06/15/99	1100	SVOA		06/16/99	1658	RAC	597
49282LCSD	06/15/99	1100	SVOA		06/16/99	1729	RAC	597
109119-10	06/15/99	1100	SVOA		06/16/99	1901	RAC	597
109119-10MS	06/15/99	1100	SVOA	QC	06/16/99	1800	RAC	597
109119-10MSD	06/15/99	1100	SVOA	QC	06/16/99	1831	RAC	597
109119-11	06/15/99	1100	SVOA		06/16/99	1932	RAC	597
108995-14	06/14/99	1015	SVOA		06/16/99	2003	RAC	597
108995-15	06/14/99	1015	SVOA		06/16/99	2033	RAC	597
DAYBL06/14	06/14/99	1015	SVOA		06/14/99	2033	TAS	597
DAYBL06/22	06/22/99	0900	SVOA		06/28/99	1839	RAC	597
109390-1	06/22/99	0900	SVOA		06/26/99	0407	RAC	597
DAYBL06/23	06/23/99	1100	SVOA		06/29/99	1942	RAC	597
109373-3DUP	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0440	RAC	597
109373-1	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0513	TAS	597
109373-2	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0545	TAS	597
109373-3	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0618	RAC	597
109373-4	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0651	RAC	597
109373-5	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0724	RAC	597
109373-6	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0756	RAC	597
109373-7	06/23/99	1100	SVOA		06/26/99	0829	RAC	597
109373-8	06/23/99	1100	SVOA		06/26/99	0902	RAC	597
109428-1	06/23/99	1100	SVOA		06/26/99	0935	RAC	597
109428-2	06/23/99	1100	SVOA		06/26/99	1007	RAC	597
109428-3	06/23/99	1100	SVOA		06/26/99	1040	RAC	597
109373-11	/ /				06/26/99	0513	RAC	597
109373-12	/ /				06/26/99	0545	RAC	597
109428-2D	/ /				06/28/99	2346	RAC	597
DAYBL06/01	/ /				06/04/99	1146	RAC	597
DAYBL07/06	07/06/99	1430	SVOA		/ /			
109373-5MS	07/06/99	1430	SVOA		07/08/99	0300	TAS	597
109373-6MSD	07/06/99	1430	SVOA		07/08/99	0334	TAS	597
109373-5MSRR	07/07/99	1730	SVOA		07/08/99	0832	TAS	597

Analytical Services Inc. Batch QC
For Report Number :109373
Volatile Organics

Matrix : Aqueous   Batch # 49357   Method : EPA 8260

Lab Control Information Analyte	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
1,1-Dichloroethene	88	83	6	72 - 119	0 - 18
Trichloroethene	103	98	5	76 - 114	0 - 18
Benzene	106	99	7	79 - 113	0 - 16
Toluene	103	95	8	73 - 115	0 - 17
Chlorobenzene	111	101	9	76 - 115	0 - 18

Matrix Spike Information Analyte	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
1,1-Dichloroethene	78	91	15	61 - 122	0 - 25
Trichloroethene	93	101	8	72 - 136	0 - 16
Benzene	105	113	7	83 - 126	0 - 15
Toluene	92	100	8	81 - 121	0 - 17
Chlorobenzene	96	106	10	86 - 125	0 - 14

Analytical Services Inc. Batch QC
Surrogate Recovery
Volatile Organics

Matrix : Aqueous Batch # 49357 Method : EPA 8260

% Recovery Objectives

S1	Dibromofluoromethane	78 - 128
S2	1,2-Dichloroethane-d4	82 - 129
S3	Toluene-d8	85 - 112
S4	4-Bromofluorobenzene	82 - 113

Sample	File	S1	S2	S3	S4	S5	S6
49357BLK	B4720	101	102	94	88		
49357LCS	B4716	101	104	96	89		
49357LCSD	B4717	102	105	96	89		
108995-16	B4724	102	105	94	87		
108995-14	B4725	102	106	95	88		
108995-15	B4726	103	105	95	89		
109054-10	B4727	102	103	96	90		
109119-10	B4728	102	103	95	89		
109119-11	B4729	103	106	95	90		
109119-12	B4730	103	106	96	88		
DAYBL 06/26	B4881	103	108	97	99		
109390-8	B4882	102	108	101	100		
109390-1	B4883	102	108	98	100		
109390-2	B4884	104	109	99	97		
109390-3	B4885	103	111	99	97		
109390-4	B4886	103	111	97	98		
109390-6	B4887	105	111	97	95		
109390-9	B4888	104	111	97	94		
109390-10	B4889	105	109	96	95		
109373-1	B4890	106	110	96	93		
109373-2	B4891	106	112	95	93		
109373-3	B4892	106	114	94	92		
109373-4	B4893	106	111	95	92		
109373-5MS	B4894	104	109	97	92		
109373-6MSD	B4895	104	110	96	94		
109373-7	B4896	105	109	96	91		

Q.C. Information for Batch # 49357 Printed: 08/04/99 18:48:14

Blank Results Information
Volatile Organics Method : EPA 8260

Analyte	Blank Result	Detection Limit
Acetone	BDL	50
Acrolein	BDL	50
Acrylonitrile	BDL	50
Benzene	BDL	5
Bromodichloromethane	BDL	5
Bromoform	BDL	5
Bromomethane	BDL	10
Carbon disulfide	BDL	5
Carbon tetrachloride	BDL	5
Chlorobenzene	BDL	5
Chloroethane	BDL	5
2-Chloroethyl vinyl ether	BDL	10
Chloroform	BDL	5
Chloromethane	BDL	10
Dibromochloromethane	BDL	5
1,2-Dibromoethane	BDL	1
Dibromomethane	BDL	2
trans-1,4-Dichloro-2-butene	BDL	10
Dichlorodifluoromethane	BDL	5
1,1-Dichloroethane	BDL	5
1,2-Dichloroethane	BDL	5
trans-1,2-Dichloroethene	BDL	5
1,1-Dichloroethene	BDL	5
Methylene chloride	BDL	5
1,2-Dichloropropane	BDL	5
cis-1,3-Dichloropropene	BDL	5
trans-1,3-Dichloropropene	BDL	5
Ethylbenzene	BDL	5
Ethyl methacrylate	BDL	5
2-Hexanone	BDL	50
Iodomethane	BDL	5
2-Butanone	BDL	50
4-Methyl-2-pentanone	BDL	50
Styrene	BDL	5
1,1,2,2-Tetrachloroethane	BDL	5
Tetrachloroethene	BDL	5
Toluene	BDL	2
1,1,1-Trichloroethane	BDL	2
1,1,2-Trichloroethane	BDL	2
Trichloroethene	BDL	2
Trichlorofluoromethane	BDL	5
1,2,3-Trichloropropane	BDL	2
Vinyl acetate	BDL	10
Vinyl chloride	BDL	1
Xylenes	BDL	5

Q.C. Information for Batch # 49357 Printed: 08/04/99 18:48:15

Sample Batch Information
Volatile Organics Method : EPA 8260

Sample ID	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
49357BLK	/ /				06/18/99	1709	REG	VOA2
49357LCS	/ /				06/18/99	1504	REG	VOA2
49357LCSD	/ /				06/18/99	1535	REG	VOA2
108995-16	/ /				06/18/99	1914	REG	VOA2
108995-14	/ /				06/18/99	1945	REG	VOA2
108995-15	/ /				06/18/99	2016	REG	VOA2
109054-10	/ /				06/18/99	2047	REG	VOA2
109119-10	/ /				06/18/99	2118	REG	VOA2
109119-11	/ /				06/18/99	2150	REG	VOA2
109119-12	/ /				06/18/99	2221	REG	VOA2
DAYBL 06/26	/ /				06/26/99	2127	LLP	VOA2
109390-8	/ /				06/26/99	2158	LLP	VOA2
109390-1	/ /				06/26/99	2230	LLP	VOA2
109390-2	/ /				06/26/99	2301	LLP	VOA2
109390-3	/ /				06/26/99	2332	LLP	VOA2
109390-4	/ /				06/27/99	0003	LLP	VOA2
109390-6	/ /				06/27/99	0035	LLP	VOA2
109390-9	/ /				06/27/99	0106	LLP	VOA2
109390-10	/ /				06/27/99	0137	LLP	VOA2
109373-1	/ /				06/27/99	0209	LLP	VOA2
109373-2	/ /				06/27/99	0240	LLP	VOA2
109373-3	/ /				06/27/99	0311	LLP	VOA2
109373-4	/ /				06/27/99	0342	LLP	VOA2
109373-5MS	/ /			AKA 109373-4	06/27/99	0414	LLP	VOA2
109373-6MSD	/ /			AKA 109373-4	06/27/99	0445	LLP	VOA2
109373-7	/ /				06/27/99	0516	LLP	VOA2

Analytical Services Inc. Batch QC
For Report Number :109373
Volatile Organics

Matrix : Aqueous   Batch # 49546   Method : EPA 8260

Lab Control Information Analyte	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
1,1-Dichloroethene	92	86	7	72 - 119	0 - 18
Trichloroethene	106	99	7	76 - 114	0 - 18
Benzene	105	103	2	79 - 113	0 - 16
Toluene	103	98	5	73 - 115	0 - 17
Chlorobenzene	110	107	3	76 - 115	0 - 18

Matrix Spike Information Analyte	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
1,1-Dichloroethene	77	77	0	61 - 122	0 - 25
Trichloroethene	92	91	1	72 - 136	0 - 16
Benzene	90	89	1	83 - 126	0 - 15
Toluene	89	88	1	81 - 121	0 - 17
Chlorobenzene	99	97	2	86 - 125	0 - 14

Analytical Services Inc. Batch QC
Surrogate Recovery
Volatile Organics

Matrix : Aqueous   Batch # 49546   Method : EPA 8260

% Recovery Objectives

S1	Dibromofluoromethane	78 - 128
S2	1,2-Dichloroethane-d4	82 - 129
S3	Toluene-d8	85 - 112
S4	4-Bromofluorobenzene	82 - 113

Sample	File	S1	S2	S3	S4	S5	S6
49546BLK	B4881	103	108	97	99		
49546LCS	B4897	104	111	97	94		
49546LCSD	B4898	106	112	96	96		
109373-8	B4899	105	112	97	93		
109373-9	B4900	105	112	97	91		
DAYBLK 07/01	B4030	107	112	96	99		
109428-1	B5049	109	120	93	94		
109428-2	B5050	108	121	93	98		
109428-3	B5051	110	118	95	92		
109428-4	B5052	108	120	95	92		
109373-8MS	B5053	107	118	93	92		
109373-8MSD	B5054	109	121	94	93		

Q.C. Information for Batch # 49546 Printed: 08/04/99 18:48:16

Blank Results Information
Volatile Organics Method : EPA 8260

Analyte	Blank Result	Detection Limit
Acetone	BDL	50
Acrolein	BDL	50
Acrylonitrile	BDL	50
Benzene	BDL	5
Bromodichloromethane	BDL	5
Bromoform	BDL	5
Bromomethane	BDL	10
Carbon disulfide	BDL	5
Carbon tetrachloride	BDL	5
Chlorobenzene	BDL	5
Chloroethane	BDL	5
2-Chloroethyl vinyl ether	BDL	10
Chloroform	BDL	5
Chloromethane	BDL	10
Dibromochloromethane	BDL	5
1,2-Dibromoethane	BDL	1
Dibromomethane	BDL	2
trans-1,4-Dichloro-2-butene	BDL	10
Dichlorodifluoromethane	BDL	5
1,1-Dichloroethane	BDL	5
1,2-Dichloroethane	BDL	5
trans-1,2-Dichloroethene	BDL	5
1,1-Dichloroethene	BDL	5
Methylene chloride	BDL	5
1,2-Dichloropropane	BDL	5
cis-1,3-Dichloropropene	BDL	5
trans-1,3-Dichloropropene	BDL	5
Ethylbenzene	BDL	5
Ethyl methacrylate	BDL	5
2-Hexanone	BDL	50
Iodomethane	BDL	5
2-Butanone	BDL	50
4-Methyl-2-pentanone	BDL	50
Styrene	BDL	5
1,1,2,2-Tetrachloroethane	BDL	5
Tetrachloroethene	BDL	5
Toluene	BDL	2
1,1,1-Trichloroethane	BDL	2
1,1,2-Trichloroethane	BDL	2
Trichloroethene	BDL	2
Trichlorofluoromethane	BDL	5
1,2,3-Trichloropropane	BDL	2
Vinyl acetate	BDL	10
Vinyl chloride	BDL	1
Xylenes	BDL	5

Q.C. Information for Batch # 49546 Printed: 08/04/99 18:48:16

Sample Batch Information
Volatile Organics Method : EPA 8260

Sample ID	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
49546BLK	/ /				06/26/99	2127	LLP	VOA2
49546LCS	/ /				06/27/99	0547	LLP	VOA2
49546LCSD	/ /				06/27/99	0619	LLP	VOA2
109373-8	/ /				06/27/99	0650	LLP	VOA2
109373-9	/ /				06/27/99	0721	LLP	VOA2
DAYBLK 07/01	/ /				07/01/99	1005	JTC	VOA2
109428-1	/ /				07/01/99	2140	JTC	VOA2
109428-2	/ /				07/01/99	2211	JTC	VOA2
109428-3	/ /				07/01/99	2243	JTC	VOA2
109428-4	/ /				07/01/99	2314	JTC	VOA2
109373-8MS	/ /				07/01/99	2345	JTC	VOA2
109373-8MSD	/ /				07/01/99	0016	JTC	VOA2

Analytical Services Inc. Batch QC
For Report Number :109373

QC Batch General Information

Batch Number	Analyte	Analysis Method	Matrix		Blank Result	Prep. Method
48711	Tl	EPA 7841	Aqueous	<	0.0010	
48711	As	EPA 7060	Aqueous	<	0.0050	
48711	Se	EPA 7740	Aqueous	<	0.0300	
48723	Ag	EPA 6010	Aqueous	<	0.0100	
48723	Ba	EPA 6010	Aqueous	<	0.0100	
48723	Be	EPA 6010	Aqueous	<	0.0030	
48723	Cd	EPA 6010	Aqueous	<	0.0050	
48723	Cr	EPA 6010	Aqueous	<	0.0100	
48723	Cu	EPA 6010	Aqueous	<	0.0200	
48723	Ni	EPA 6010	Aqueous	<	0.0200	
48723	Pb	EPA 6010	Aqueous	<	0.0050	
48723	Sb	EPA 6010	Aqueous	<	0.0060	
48723	Zn	EPA 6010	Aqueous	<	0.0200	
49103	Hg	EPA 7470	Aqueous	<	0.0005	
49450	CN	EPA 9014	Aq/Solid	<	0.0200	

Lab Control Information

Batch Number	Analyte	Method	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
48711	Tl	EPA 7841	102	102	0	76 - 124	0 - 20
48711	As	EPA 7060	90	89	1	76 - 124	0 - 20
48711	Se	EPA 7740	98	83	17	76 - 124	0 - 20
48723	Ag	EPA 6010	100	100	0	76 - 124	0 - 20
48723	Ba	EPA 6010	98	96	2	76 - 124	0 - 20
48723	Be	EPA 6010	98	97	1	76 - 124	0 - 20
48723	Cd	EPA 6010	99	97	2	76 - 124	0 - 20
48723	Cr	EPA 6010	100	100	0	76 - 124	0 - 20
48723	Cu	EPA 6010	100	98	2	76 - 124	0 - 20
48723	Ni	EPA 6010	98	96	2	76 - 124	0 - 20
48723	Pb	EPA 6010	100	100	0	76 - 124	0 - 20
48723	Sb	EPA 6010	100	99	1	76 - 124	0 - 20
48723	Zn	EPA 6010	100	99	1	76 - 124	0 - 20
49103	Hg	EPA 7470	91	95	4	76 - 124	0 - 20
49450	CN	EPA 9014	93	88	6	85 - 115	0 - 30

Analytical Services Inc. Batch QC
For Report Number :109373

Matrix Spike Information

Batch Number	Analyte	Method	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
48711	Tl	EPA 7841	74	53	33	65 - 121	0 - 20
48711	As	EPA 7060	63	59	7	25 - 140	0 - 22
48711	Se	EPA 7740	39	44	12	10 - 136	0 - 30
48723	Ag	EPA 6010	95	97	2	56 - 132	0 - 8
48723	Ba	EPA 6010	89	91	2	84 - 103	0 - 7
48723	Be	EPA 6010	88	90	2	85 - 103	0 - 9
48723	Cd	EPA 6010	88	90	2	84 - 102	0 - 8
48723	Cr	EPA 6010	92	94	2	86 - 103	0 - 8
48723	Cu	EPA 6010	92	95	3	81 - 101	0 - 8
48723	Ni	EPA 6010	86	88	2	86 - 101	0 - 7
48723	Pb	EPA 6010	91	93	2	89 - 103	0 - 8
48723	Sb	EPA 6010	83	83	0	83 - 110	0 - 7
48723	Zn	EPA 6010	88	93	6	81 - 107	0 - 11
49103	Hg	EPA 7470	79	87	10	73 - 119	0 - 17
49450	CN	EPA 9014	86	87	1	61 - 118	0 - 13

Post Digestion Spike Information

Batch Number	Analyte	Method	PDS %Rec	%Recovery Range
48711	Tl	EPA 7841	95	76 - 124
48711	As	EPA 7060	97	76 - 124
48711	Se	EPA 7740	116	76 - 124
48723	Ag	EPA 6010	110	76 - 124
48723	Ba	EPA 6010	100	76 - 124
48723	Be	EPA 6010	100	76 - 124
48723	Cd	EPA 6010	100	76 - 124
48723	Cr	EPA 6010	110	76 - 124
48723	Cu	EPA 6010	100	76 - 124
48723	Ni	EPA 6010	100	76 - 124
48723	Pb	EPA 6010	100	76 - 124
48723	Sb	EPA 6010	100	76 - 124
48723	Zn	EPA 6010	120	76 - 124

Unspiked Sample Duplicate Information

Batch Number	Analyte	Method	Sample 1 RPD	Sample 2 RPD	RPD Range
49103	Hg	EPA 7470	20		0 - 17
49450	CN	EPA 9014	0	0	0 - 13

Q.C. Information for Batch # 48711 For Report Number :109373

Sample Batch Information
Analysis : Tl, As, Se

Sample ID	Tag	Preparation Date	Time	By	Preparation Notes	Analysis Date	Time	By	In
48711BLANK	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
48711LCS	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
48711LCSD	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-5MS	Tl	06/24/99	0905	ELK	AKA 109373-1	06/25/99	1222	DCF	AA2
109373-6MSD	Tl	06/24/99	0905	ELK	AKA 109373-1	06/25/99	1222	DCF	AA2
109428-2PDS	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109428-2DUP	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-1	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-2	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-3	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-4	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-7	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-8	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109390-1	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109428-1	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109428-2	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109428-3	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
48711BLANK	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
48711LCS	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
48711LCSD	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109373-5MS	Se	06/24/99	0905	ELK	AKA 109373-1	06/28/99	0927	RCP	AA3
109373-6MSD	Se	06/24/99	0905	ELK	AKA 109373-1	06/28/99	0927	RCP	AA
109428-2PDS	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109428-2DUP	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109373-1	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109373-2	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109373-3	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109373-4	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109373-7	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109373-8	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109390-1	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109428-1	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109428-2	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
109428-3	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA
48711BLANK	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
48711LCS	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
48711LCSD	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109373-5MS	As	06/24/99	0905	ELK	AKA 109373-1	06/28/99	1308	RCP	AA
109373-6MSD	As	06/24/99	0905	ELK	AKA 109373-1	06/28/99	1308	RCP	AA
109428-2PDS	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109428-2DUP	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109373-1	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109373-2	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109373-3	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109373-4	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109373-7	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109373-8	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA
109390-1	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA

Q.C. Information for Batch # 48711 For Report Number :109373

Sample Batch Information
Analysis : Tl, As, Se

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Ins
109428-1	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109428-2	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109428-3	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1

Q.C. Information for Batch # 48723 For Report Number :109373

Sample Batch Information
Analysis : Ag, Ba, Be, Cd, Cr, Cu, Ni, Pb, Sb, Zn

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	In
48723BLANK		06/25/99	1300	ELK	TRACE	06/28/99	1723	MAB	IC
48723LCS		06/25/99	1300	ELK	TRACE	06/28/99	1727	MAB	IC
48723LCSD		06/25/99	1300	ELK	TRACE	06/28/99	1731	MAB	IC
109373-5MS		06/25/99	1300	ELK	AKA 109373-1	06/28/99	1639	MAB	IC
109373-6MSD		06/25/99	1300	ELK	AKA 109373-1	06/28/99	1643	MAB	IC
109373-7PDS		06/25/99	1300	ELK	TRACE	06/28/99	1736	MAB	IC
109373-8DUP		06/25/99	1300	ELK	TRACE	06/28/99	1740	MAB	IC
109373-1RR		06/25/99	1300	ELK	TRACE	06/28/99	1648	MAB	IC
109373-2RR		06/25/99	1300	ELK	TRACE	06/28/99	1652	MAB	IC
109373-3RR		06/25/99	1300	ELK	TRACE	06/28/99	1656	MAB	IC
109373-4RR		06/25/99	1300	ELK	TRACE	06/28/99	1701	MAB	IC
109373-7RR		06/25/99	1300	ELK	TRACE	06/28/99	1705	MAB	IC
109373-8RR		06/25/99	1300	ELK	TRACE	06/28/99	1709	MAB	IC
109390-1RR		06/25/99	1300	ELK	TRACE	06/28/99	1744	MAB	IC
109428-1RR		06/25/99	1300	ELK	TRACE	06/28/99	1749	MAB	IC
109428-2RR		06/25/99	1300	ELK	TRACE	06/28/99	1753	MAB	IC
109428-3RR		06/25/99	1300	ELK	TRACE	06/28/99	1758	MAB	IC

Q.C. Information for Batch # 49103 For Report Number :109373

Sample Batch Information
Analysis : Hg

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Ins
49103BLANK	Hg	06/25/99	0935	MLR	AQU	06/25/99	1359	MLR	HG1
49103LCS	Hg	06/25/99	0935	MLR	AQU	06/25/99	1402	MLR	HG1
49103LCSD	Hg	06/25/99	0935	MLR	AQU	06/25/99	1404	MLR	HG1
109373-5MS	Hg	06/25/99	0935	MLR	AKA 109373-1	06/25/99	1407	MLR	HG1
109373-6MSD	Hg	06/25/99	0935	MLR	AKA 109373-1	06/25/99	1409	MLR	HG1
109373-6DUP	Hg	06/25/99	0935	MLR	AKA 109373-1	06/25/99	1412	MLR	HG1
109373-1	Hg	06/25/99	0935	MLR	AQU	06/25/99	1414	MLR	HG1
109373-2	Hg	06/25/99	0935	MLR	AQU	06/25/99	1417	MLR	HG1
109373-3	Hg	06/25/99	0935	MLR	AQU	06/25/99	1419	MLR	HG1
109373-4	Hg	06/25/99	0935	MLR	AQU	06/25/99	1422	MLR	HG1
109373-5	Hg	06/25/99	0935	MLR	AQU	06/25/99	1430	MLR	HG1
109373-6	Hg	06/25/99	0935	MLR	AQU	06/25/99	1432	MLR	HG1
109373-7	Hg	06/25/99	0935	MLR	AQU	06/25/99	1435	MLR	HG1
109373-8	Hg	06/25/99	0935	MLR	AQU	06/25/99	1437	MLR	HG1
109390-1	Hg	06/25/99	0935	MLR	AQU	06/25/99	1439	MLR	HG1
109428-2	Hg	06/25/99	0935	MLR	AQU	06/25/99	1444	MLR	HG1
109428-3	Hg	06/25/99	0935	MLR	AQU	06/25/99	1447	MLR	HG1
109428-1	Hg	06/25/99	0935	MLR	AQU	06/25/99	1442	MLR	HG1

Q.C. Information for Batch # 49450 For Report Number :109373

Sample Batch Information
Analysis : CN

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Ins
49450BLK		06/22/99	0935	HH	MIDI-DIST	06/22/99	1500	HH	GEN
49450LCS		06/22/99	0935	HH	MIDI-DIST	06/22/99	1500	HH	GEN
49450LCSD		06/22/99	0935	HH	MIDI-DIST	06/22/99	1500	HH	GEN
109373-1		06/22/99	0935	HH	MIDI-DIST	06/22/99	1500	HH	GEN
109373-4		06/22/99	0935	HH	MIDI-DIST	06/22/99	1500	HH	GEN
109373-5MS		06/22/99	0935	HH	AKA 109373-4	06/22/99	1500	HH	GEN
109373-6MSD		06/22/99	0935	HH	AKA 109373-4	06/22/99	1500	HH	GEN
109373-2		06/22/99	0935	HH	MIDI-DIST	06/22/99	1500	HH	GEN
109373-3		06/22/99	0935	HH	MIDI-DIST	06/22/99	1500	HH	GEN
109373-4DUP		06/22/99	0935	HH	MIDI-DIST	06/22/99	1500	HH	GEN
109373-7		06/22/99	1200	HH	MIDI-DIST	06/22/99	1800	HH	GEN
109373-8		06/22/99	1200	HH	MIDI-DIST	06/22/99	1800	HH	GEN
108995-14		06/22/99	1200	HH	MIDI-DIST	06/22/99	1800	HH	GEN
108995-15		06/22/99	1200	HH	MIDI-DIST	06/22/99	1800	HH	GEN
109119-10		06/22/99	1200	HH	MIDI-DIST	06/22/99	1800	HH	GEN
109119-11		06/22/99	1200	HH	MIDI-DIST	06/22/99	1800	HH	GEN
109119-11DUP		06/22/99	1200	HH	MIDI-DIST	06/22/99	1800	HH	GEN
CALCK5		06/22/99	1200	HH	MIDI-DIST	06/22/99	1800	HH	GEN
CALCK15		06/22/99	1200	HH	MIDI-DIST	06/22/99	1800	HH	GEN
CALCK5		06/22/99	1200	HH	MIDI-DIST	06/22/99	1800	HH	GEN

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

ASI# 109373 V P4 C3 4

Laboratory Task Order No. 09613

CHAIN-OF-CUSTODY RECORD

Project Number TF0003200016

Project Location SLOSS INDUSTRIES / B-HAM

Laboratory ASI

Sampler(s)/Affiliation JASON KIRKPATRICK
AARON STEARNS

SAMPLE BOTTLE / CONTAINER DESCRIPTION

	SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	SVOC's (EPA 8270C) 1 liter Amber glass no pres. / on ice d,e	CYANIDE (9010) 950 mL plastic w/ NaOH on ice f	Mercury (7470) 500 mL glass w/ HNO3 / on ice g	Priority Pollutant Metals + Barium 500 mL plastic w/ HNO3, on ice h		VOC's (EPA 8260) 40 mL VOA vial w/ HCL, on ice a-c		TEMPERATURE BLANK		TOTAL	
70617	-BT-13-FB0001	L	6/17/99 1120		2	1	1	1		3				8	-7
70617	-BT-13-GWEB01	L	1130		2	1	1	1		3				8	-8
70617	-BT-15-TB0001	L	—							2 ~~3~~				2	-9
70617	-BT-13-GW0041	L	1345							3				3	-1
70617	-BT-13-GW0042	L	1540							3				3	-2
70617	-BT-13-GW0043	L	1210							3				3	-3
70617	-BT-13-GW9041	L	—							3				3	-4
70617	-BT-13-GW0041	MS	1345							3				3	-5
70617	-BT-13-GW0041	MSD	1345							3				3	-6
	TEMP.											1		1	

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 37

Relinquished by: [signature]	Organization: ARCADIS Geraghty + Miller	Date 6/17/99	Time 1800	Seal Intact?
Received by: [signature]	Organization: ASI	Date 6/18/99	Time 07:45	Yes No N/A
Relinquished by:	Organization:	Date / /	Time	Seal Intact?
Received by:	Organization:	Date / /	Time	Yes No N/A

Special Instructions/Remarks:
ice, seal intact, Temp = 2°c, pH = 1 (Met) 12 (CN) [signature] 6-18-99

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

Laboratory Task Order No. 09619

CHAIN-OF-CUSTODY RECORD

Project Number TF000320.0016

Project Location Sloss Industries / B-HAM

Laboratory ASI

Sampler(s)/Affiliation Jason Kirkpatrick
Aaron Stearns

SAMPLE BOTTLE / CONTAINER DESCRIPTION

	SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	SVOC's (EPA 8270 C) 1 liter amber glass no pres. / on ice	Cyanide (9010) 950 mL plastic w/NaOH, on ice	Mercury (7470) 500 mL glass w/HNO3, on ice	Priority Pollutant Metals + Barium 500 mL plastic w/HNO3, on ice			Temperature Blank			TOTAL	
0617	BT-13-GW0041	L	6/17/99 1345		2	1	1	1						5	-1
0617	BT-13-GW9041	L	6/17/99 1345		2	1	1	1						5	-4
	Temp Blank										1			1	

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 11

Relinquished by: Aaron Stearns	Organization: ARCADIS Geraghty + Miller	Date 6/17/99	Time 1800	Seal Intact?
Received by:	Organization:	Date / /	Time	Yes No N/A
Relinquished by:	Organization:	Date / /	Time	Seal Intact?
Received by: [signature]	Organization: ASI	Date 6/18/99	Time 07:45	Yes No N/A

Special Instructions/Remarks:
ice, seal intact, temp. 2°C pH = 1 (Met) 12 (CN) [signature] 6-18-99 2 samples, 10 ct

219

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

Laboratory Task Order No. 09619

CHAIN-OF-CUSTODY RECORD

Project Number 7F000320.0016

Project Location Sloss Industries, B-HAM

Laboratory ASI

Sampler(s)/Affiliation Jason Kirkpatrick
Aaron Stearns

SAMPLE BOTTLE / CONTAINER DESCRIPTION

	SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	SVOC's (EPA 8270 C) 1 liter amber glass no pres. / on ice	Cyanide (9010) 250 mL plastic w/ NaOH, on ice	Mercury (7470) 500 mL glass w/ HNO3, on ice	Priority Pollutant Metals + Barium 500 mL plastic w/ HNO3, on ice			Temperature Blank			TOTAL	
0617	BT-13-GW0042	L	6/17/99 1540		2	1	1	1						5	-2
0617	BT-13-GW0043	L	6/17/99 1210		2	1	1	1						5	-3
	Temp Blank										1			1	

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 11

Relinquished by: Aaron Stearns	Organization: ARCADIS Geraghty + Miller	Date 6/17/99	Time 1800	Seal Intact?
Received by:	Organization:	Date / /	Time	Yes No N/A
Relinquished by:	Organization:	Date / /	Time	Seal Intact?
Received by: [signature]	Organization: ASI	Date 6/18/99	Time 07:45	(Yes) No N/A

Special Instructions/Remarks:
ice, seal intact, temp = 2°C, pH = 1(Met) 12(CN) [signature] 6-18-99 2 samples, 10 ct

220

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

Laboratory Task Order No. 09619

CHAIN-OF-CUSTODY RECORD

Project Number TF000320.0016

Project Location Sloss Industries / B-HAm

Laboratory ASI

Sampler(s)/Affiliation Jason Kirkpatrick, Aaron Stearns

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	SVOC's (EPA 8270C) 1 liter amber glass no pres./on ice	Cyanide (9010) 950 mL plastic w/ NaOH, on ice	Mercury (7470) 500 mL glass w/ HNO3 on ice	Priority Pollutant Metals + Barium 500 mL plastic w/ HNO3, on ice				Temperature Blank		TOTAL
190617 - BT-13-GW004	ms	6/17/99 1345		2	1	1	1						5 -5
190617 - BT-13-GW004	msD	6/17/99 1345		2	1	1	1						5 -6
Temp Blank											1		1

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers: 11

Relinquished by: Aaron Stearns	Organization: ARCADIS Geraghty + Miller	Date 6/17/99	Time 1800	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by: [signature]	Organization: ASI	Date 06/18/99	Time 07:45	Yes (circled)

Special Instructions/Remarks:

ice, seal intact, temp = 2°C, pH = 12 (CN) 1 (Met) [signature] 6-18-99 2 samples, 10 ct

ASI

ANALYTICAL SERVICES, INC.

ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS

110 TECHNOLOGY PARKWAY • NORCROSS, GA 30092
(770) 734-4200 • FAX (770) 734-4201

ARCADIS Geraghty & Miller, Inc
Project Name: Sloss Industries
Project Number: TF00320.0016
ASI Report #109428

ASI Sample ID	ARCADIS Sample ID	Analysis
109428-1	990621-BT-13-GW0044	CN, Metals, 8260, 8270
109428-2	990621-BT-13-GW0038	CN, Metals, 8260, 8270
109428-3	990621-BT-13-GW0039	CN, Metals, 8260, 8270
109428-4	990621-BT-13-TB0004	8260
109428-5	990621-BT-IW-SL0043	CN, Metals, 8260, 8270
109428-6	990621-BT-IW-SL0042	CN, Metals, 8260, 8270
109428-7	990621-BT-IW-SL0041	CN, Metals, 8260, 8270
109428-8	990621-BT-IW-SL0038	CN, Metals, 8260, 8270
109428-9	990621-BT-IW-SL0039	CN, Metals, 8260, 8270
109428-10	990621-BT-IW-SL0040	CN, Metals, 8260, 8270
109428-11	990621-BT-IW-SL0044	CN, Metals, 8260, 8270
109428-12	990621-BT-IW-SL0000	CN, Metals, 8260, 8270

ASI

ANALYTICAL SERVICES, INC.

ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS

110 TECHNOLOGY PARKWAY • NORCROSS GA 30092

(770) 734-4200 • (770) 734-4201 FAX

8 July, 1999

Case Narrative ASI Sample 109428

Eight soil and four aqueous samples were collected on 21 June, 1999 and arrived at ASI on 22 June, 1999. The sample cooler temperature was 1°C upon arrival as indicated on the Chain of Custody. The samples were logged into LIMS as ASI sample 109428 for analysis of BNA, VOC, metals, and cyanide. All non-QC samples were reported on a dry-weight basis. All holding times were met.

Base neutrals/acids were analyzed in batches 49259/49282 using EPA method 8270. Soil samples were analyzed in batch 49259 and aqueous samples were analyzed in batch 49282. In batch 49259, the LC/LCD recoveries for n-nitrosodipropylamine, 1,2,4-trichlorobenzene, and 4-dinitrotoluene and the LCD recovery for pentachlorophenol were above acceptance limits but within control limits. The MSD recovery for 4-nitrophenol and the MS RPD for phenol were high. Samples 109428-7, 109428-10, and 109428-12 were reanalyzed at a 1:10 dilution. The S1 and S5 surrogate recoveries for 109428-12 and 109428-12D were low due to matrix interference. All other measurement quality objectives were met for batch 49259. In batch 49282, the MS RPD for phenol was high. Sample 109428-2 was reanalyzed at a 1:10 dilution. All other measurement quality objectives were met for batch 49282.

Volatile organics were analyzed in batches 49456/49679 using EPA method 8260. Aqueous samples were analyzed in batch 49546 and soil samples were analyzed in batch 49679. In batch 49456, all measurement quality objectives were met. In batch 49679, sample 109428-5 was used for the MS/MSD. The LC recovery for trichloroethene and the MS recoveries for trichloroethene and 1,1-dichloroethene were slightly below acceptance limits but within control limits. The MS RPDs for trichloroethene, benzene, and toluene were above acceptance limits. All 109428 samples were analyzed as high level (methanol) extracts prepared by the laboratory. All other measurement quality objectives were met.

Thallium, arsenic, and selenium were analyzed in batches 48711/48736 using EPA methods 7841, 7060, and 7740, respectively. Aqueous samples were analyzed in batch 48711 and soil samples were analyzed in batch 48736. In batch 48711, the MS RPD was high for thallium due to a low MSD recovery. All other measurement quality objectives were met for 48711. In batch 48736, the MS RPD for selenium was high. All other measurement quality objectives were met for batch 48736.

ICP metals were analyzed in batches 48723/48742 using EPA method 6010. Aqueous samples were analyzed in batch 48723 and soil samples were analyzed in batch 48742. In batch 48723, all samples were redigested and reanalyzed. All other measurement quality objectives were met for batch 48723. In batch 48742, the MSD recovery for barium and the MS/MSD recoveries for chromium were slightly below acceptance limits. The MS RPD for chromium was above acceptance limits. All other measurement quality objectives were met for batch 48742.

Mercury for aqueous samples were analyzed in batch 49103 using EPA method 7470. Mercury for soil samples were analyzed in batch 49107 using EPA method 7471. The sample duplicate RPD was above acceptance limits for batch 49103. The MSD recovery was zero for batch 49107. All other measurement quality objectives were met.

Cyanide was analyzed in batches 49688/49737 using EPA method 9014. The sample duplicate RPD was above acceptance limits for batch 49688. All other measurement quality objectives were met.

Respectfully yours,

Jon Neuhaus
Quality Assurance

ASI
ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-1**

August 5, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0044, 06/21/99, 09:00, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
57125	Total Cyanide	0.04	0.02	mg/L	1	EPA 9014
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	BDL	0.01	mg/L	1	EPA 7060A
7440393	Total Barium	0.22	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	BDL	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	BDL	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	BDL	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	BDL	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	BDL	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	BDL	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	BDL	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	BDL	0.04	mg/L	1	EPA 7740
7440224	Total Silver	BDL	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	BDL	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	0.07	0.02	mg/L	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Report No.: **109428-1** August 5, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0044, 06/21/99, 09:00, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	BDL	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	10	ug/L	1	EPA 8270C
95578	2-Chlorophenol	BDL	10	ug/L	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270C
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270C
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270C
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270C
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270C
100027	4-Nitrophenol	BDL	50	ug/L	1	EPA 8270C
87865	Pentachlorophenol	BDL	10	ug/L	1	EPA 8270C
108952	Phenol	BDL	10	ug/L	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: **109428-1** August 5, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0044, 06/21/99, 09:00, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	BDL	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	BDL	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	BDL	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270C
206440	Fluoranthene	BDL	10	ug/L	1	EPA 8270C
86737	Fluorene	BDL	10	ug/L	1	EPA 8270C
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270C
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	10	ug/L	1	EPA 8270C
78591	Isophorone	BDL	10	ug/L	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	10	ug/L	1	EPA 8270C
91203	Naphthalene	BDL	10	ug/L	1	EPA 8270C
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: **109428-1** August 5, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0044, 06/21/99, 09:00, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270C
621647	N-Nitrosodi-n-propylamine	BDL	10	ug/L	1	EPA 8270C
85018	Phenanthrene	BDL	10	ug/L	1	EPA 8270C
129000	Pyrene	BDL	10	ug/L	1	EPA 8270C
110861	Pyridine	BDL	10	ug/L	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	10	ug/L	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-2**

August 5, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0038, 06/21/99, 12:10, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
57125	Total Cyanide	0.06	0.02	mg/L	1	EPA 9014
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	BDL	0.01	mg/L	1	EPA 7060A
7440393	Total Barium	0.22	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	BDL	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	BDL	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	BDL	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	BDL	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	BDL	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	BDL	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	BDL	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	BDL	0.04	mg/L	1	EPA 7740
7440224	Total Silver	BDL	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	BDL	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	0.32	0.02	mg/L	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	12	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	6	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Report No.: **109428-2** August 5, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0038, 06/21/99, 12:10, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	2	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	14	5	ug/L	1	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	10	ug/L	1	EPA 8270C
95578	2-Chlorophenol	BDL	10	ug/L	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270C
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270C
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270C
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270C
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270C
100027	4-Nitrophenol	BDL	50	ug/L	1	EPA 8270C
87865	Pentachlorophenol	BDL	10	ug/L	1	EPA 8270C
108952	Phenol	BDL	10	ug/L	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: **109428-2** August 5, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0038, 06/21/99, 12:10, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	BDL	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	BDL	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	BDL	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270C
206440	Fluoranthene	BDL	10	ug/L	1	EPA 8270C
86737	Fluorene	BDL	10	ug/L	1	EPA 8270C
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270C
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	10	ug/L	1	EPA 8270C
78591	Isophorone	BDL	10	ug/L	1	EPA 8270C
91576	2-Methylnaphthalene	16	10	ug/L	1	EPA 8270C
91203	Naphthalene	420	100	ug/L	10	EPA 8270C
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: **109428-2** August 5, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0038, 06/21/99, 12:10, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270C
621647	N-Nitrosodi-n-propylamine	BDL	10	ug/L	1	EPA 8270C
85018	Phenanthrene	BDL	10	ug/L	1	EPA 8270C
129000	Pyrene	BDL	10	ug/L	1	EPA 8270C
110861	Pyridine	BDL	10	ug/L	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	10	ug/L	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-3**

August 5, 1999

Sample Description

Sloss Industries
Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0039, 06/21/99, 10:45, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
57125	Total Cyanide	BDL	0.02	mg/L	1	EPA 9014
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	0.006	mg/L	1	EPA 6010A
7440382	Total Arsenic	BDL	0.01	mg/L	1	EPA 7060A
7440393	Total Barium	0.20	0.01	mg/L	1	EPA 6010A
7440417	Total Beryllium	BDL	0.004	mg/L	1	EPA 6010A
7440439	Total Cadmium	BDL	0.005	mg/L	1	EPA 6010A
7440473	Total Chromium	0.02	0.01	mg/L	1	EPA 6010A
7440508	Total Copper	0.05	0.02	mg/L	1	EPA 6010A
7439921	Total Lead	0.020	0.015	mg/L	1	EPA 6010A
7439976	Total Mercury	BDL	0.0005	mg/L	1	EPA 7470
7440020	Total Nickel	BDL	0.02	mg/L	1	EPA 6010A
7782492	Total Selenium	BDL	0.04	mg/L	1	EPA 7740
7440224	Total Silver	BDL	0.01	mg/L	1	EPA 6010A
7440280	Total Thallium	BDL	0.002	mg/L	1	EPA 7841
7440666	Total Zinc	0.24	0.02	mg/L	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Report No.: **109428-3** August 5, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0039, 06/21/99, 10:45, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	BDL	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	10	ug/L	1	EPA 8270C
95578	2-Chlorophenol	BDL	10	ug/L	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	10	ug/L	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	10	ug/L	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	50	ug/L	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	50	ug/L	1	EPA 8270C
95487	2-Methylphenol	BDL	10	ug/L	1	EPA 8270C
108394	3-Methylphenol	BDL	10	ug/L	1	EPA 8270C
106445	4-Methylphenol	BDL	10	ug/L	1	EPA 8270C
88755	2-Nitrophenol	BDL	10	ug/L	1	EPA 8270C
100027	4-Nitrophenol	BDL	50	ug/L	1	EPA 8270C
87865	Pentachlorophenol	BDL	10	ug/L	1	EPA 8270C
108952	Phenol	BDL	10	ug/L	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0039, 06/21/99, 10:45, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
88062	2,4,6-Trichlorophenol	BDL	10	ug/L	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	10	ug/L	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	10	ug/L	1	EPA 8270C
208968	Acenaphthylene	BDL	10	ug/L	1	EPA 8270C
120127	Anthracene	BDL	10	ug/L	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	10	ug/L	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	10	ug/L	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	10	ug/L	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	10	ug/L	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	10	ug/L	1	EPA 8270C
100516	Benzyl Alcohol	BDL	10	ug/L	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	10	ug/L	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	10	ug/L	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	10	ug/L	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	10	ug/L	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
106478	p-Chloroaniline	BDL	10	ug/L	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	10	ug/L	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	10	ug/L	1	EPA 8270C
218019	Chrysene	BDL	10	ug/L	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	10	ug/L	1	EPA 8270C
132649	Dibenzofuran	BDL	10	ug/L	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	10	ug/L	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	10	ug/L	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	100	ug/L	1	EPA 8270C
84662	Diethylphthalate	BDL	10	ug/L	1	EPA 8270C
131113	Dimethylphthalate	BDL	10	ug/L	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	10	ug/L	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	10	ug/L	1	EPA 8270C
206440	Fluoranthene	BDL	10	ug/L	1	EPA 8270C
86737	Fluorene	BDL	10	ug/L	1	EPA 8270C
118741	Hexachlorobenzene	BDL	10	ug/L	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	10	ug/L	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	10	ug/L	1	EPA 8270C
67721	Hexachloroethane	BDL	2	ug/L	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	10	ug/L	1	EPA 8270C
78591	Isophorone	BDL	10	ug/L	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	10	ug/L	1	EPA 8270C
91203	Naphthalene	17	10	ug/L	1	EPA 8270C
88744	2-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
99092	3-Nitroaniline	BDL	10	ug/L	1	EPA 8270C
100016	4-Nitroaniline	BDL	10	ug/L	1	EPA 8270C

BDL - Below Detection Limit

Report No.: **109428-3** August 5, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-GW0039, 06/21/99, 10:45, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
98953	Nitrobenzene	BDL	10	ug/L	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	10	ug/L	1	EPA 8270C
621647	N-Nitrosodi-n-propylamine	BDL	10	ug/L	1	EPA 8270C
85018	Phenanthrene	BDL	10	ug/L	1	EPA 8270C
129000	Pyrene	BDL	10	ug/L	1	EPA 8270C
110861	Pyridine	BDL	10	ug/L	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	10	ug/L	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin

Report No.: **109428-4**

August 5, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-TB0004, 06/21/99, , received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	50	ug/L	1	EPA 8260B
107028	Acrolein	BDL	50	ug/L	1	EPA 8260B
107131	Acrylonitrile	BDL	50	ug/L	1	EPA 8260B
71432	Benzene	BDL	5	ug/L	1	EPA 8260B
75274	Bromodichloromethane	BDL	5	ug/L	1	EPA 8260B
75252	Bromoform	BDL	5	ug/L	1	EPA 8260B
74839	Bromomethane	BDL	10	ug/L	1	EPA 8260B
75150	Carbon disulfide	BDL	5	ug/L	1	EPA 8260B
56235	Carbon tetrachloride	BDL	5	ug/L	1	EPA 8260B
108907	Chlorobenzene	BDL	5	ug/L	1	EPA 8260B
75003	Chloroethane	BDL	5	ug/L	1	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	10	ug/L	1	EPA 8260B
67663	Chloroform	BDL	5	ug/L	1	EPA 8260B
74873	Chloromethane	BDL	10	ug/L	1	EPA 8260B
124481	Dibromochloromethane	BDL	5	ug/L	1	EPA 8260B
106934	1,2-Dibromoethane	BDL	1	ug/L	1	EPA 8260B
74953	Dibromomethane	BDL	2	ug/L	1	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	10	ug/L	1	EPA 8260B
75718	Dichlorodifluoromethane	BDL	5	ug/L	1	EPA 8260B
75343	1,1-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
107062	1,2-Dichloroethane	BDL	5	ug/L	1	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75354	1,1-Dichloroethene	BDL	5	ug/L	1	EPA 8260B
75092	Methylene chloride	BDL	5	ug/L	1	EPA 8260B
78875	1,2-Dichloropropane	BDL	5	ug/L	1	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	5	ug/L	1	EPA 8260B
100414	Ethylbenzene	BDL	5	ug/L	1	EPA 8260B
97632	Ethyl methacrylate	BDL	5	ug/L	1	EPA 8260B
591786	2-Hexanone	BDL	50	ug/L	1	EPA 8260B
74884	Iodomethane	BDL	5	ug/L	1	EPA 8260B
78933	2-Butanone	BDL	50	ug/L	1	EPA 8260B

BDL - Below Detection Limit

Report No.: **109428-4** August 5, 1999

Sample Description

Sloss Industries

Water, Birmingham, Project #TF00320.0016, 990621-BT-13-TB0004, 06/21/99, , received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108101	4-Methyl-2-pentanone	BDL	50	ug/L	1	EPA 8260B
100425	Styrene	BDL	5	ug/L	1	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	5	ug/L	1	EPA 8260B
127184	Tetrachloroethene	BDL	5	ug/L	1	EPA 8260B
108883	Toluene	BDL	2	ug/L	1	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	2	ug/L	1	EPA 8260B
79016	Trichloroethene	BDL	2	ug/L	1	EPA 8260B
75694	Trichlorofluoromethane	BDL	5	ug/L	1	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	2	ug/L	1	EPA 8260B
108054	Vinyl acetate	BDL	10	ug/L	1	EPA 8260B
75014	Vinyl chloride	BDL	1	ug/L	1	EPA 8260B
1330207	Xylenes	BDL	5	ug/L	1	EPA 8260B

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-5**

August 5, 1999

Sample Description

Sloss Industries
Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0043, 06/21/99, 13:25, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	General Chemistry					
57125	Total Cyanide	0.33	0.24	mg/kg	1	EPA 9014
	Moisture	17	0.04	%	1	
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	6.0	mg/kg	1	EPA 6010A
7440382	Total Arsenic	15.0	0.51	mg/kg	1	EPA 7060A
7440393	Total Barium	110	1.2	mg/kg	1	EPA 6010A
7440417	Total Beryllium	BDL	0.6	mg/kg	1	EPA 6010A
7440439	Total Cadmium	1.2	0.6	mg/kg	1	EPA 6010A
7440473	Total Chromium	3.9	1.2	mg/kg	1	EPA 6010A
7440508	Total Copper	13	2.4	mg/kg	1	EPA 6010A
7439921	Total Lead	13	3.0	mg/kg	1	EPA 6010A
7439976	Total Mercury	BDL	0.30	mg/kg	1	EPA 7471
7440020	Total Nickel	4.7	2.4	mg/kg	1	EPA 6010A
7782492	Total Selenium	BDL	0.51	mg/kg	1	EPA 7740
7440224	Total Silver	BDL	1.2	mg/kg	1	EPA 6010A
7440280	Total Thallium	0.17	0.10	mg/kg	1	EPA 7841
7440666	Total Zinc	17	2.4	mg/kg	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	3000	ug/kg	50	EPA 8260B
107028	Acrolein	BDL	3000	ug/kg	50	EPA 8260B
107131	Acrylonitrile	BDL	1000	ug/kg	50	EPA 8260B
71432	Benzene	BDL	300	ug/kg	50	EPA 8260B
75274	Bromodichloromethane	BDL	300	ug/kg	50	EPA 8260B
75252	Bromoform	BDL	300	ug/kg	50	EPA 8260B
74839	Bromomethane	BDL	600	ug/kg	50	EPA 8260B
75150	Carbon disulfide	BDL	300	ug/kg	50	EPA 8260B
56235	Carbon tetrachloride	BDL	300	ug/kg	50	EPA 8260B
108907	Chlorobenzene	BDL	300	ug/kg	50	EPA 8260B
75003	Chloroethane	BDL	300	ug/kg	50	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	600	ug/kg	50	EPA 8260B
67663	Chloroform	BDL	300	ug/kg	50	EPA 8260B

240

BDL - Below Detection Limit
[illegible]

Report No.: **109428-5** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0043, 06/21/99, 13:25, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
74873	Chloromethane	BDL	600	ug/kg	50	EPA 8260B
124481	Dibromochloromethane	BDL	300	ug/kg	50	EPA 8260B
106934	1,2-Dibromoethane	BDL	120	ug/kg	50	EPA 8260B
74953	Dibromomethane	BDL	120	ug/kg	50	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	600	ug/kg	50	EPA 8260B
75718	Dichlorodifluoromethane	BDL	300	ug/kg	50	EPA 8260B
75343	1,1-Dichloroethane	BDL	300	ug/kg	50	EPA 8260B
107062	1,2-Dichloroethane	BDL	300	ug/kg	50	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	300	ug/kg	50	EPA 8260B
75354	1,1-Dichloroethene	BDL	300	ug/kg	50	EPA 8260B
75092	Methylene chloride	BDL	300	ug/kg	50	EPA 8260B
78875	1,2-Dichloropropane	BDL	300	ug/kg	50	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	300	ug/kg	50	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	300	ug/kg	50	EPA 8260B
100414	Ethylbenzene	BDL	300	ug/kg	50	EPA 8260B
97632	Ethyl methacrylate	BDL	300	ug/kg	50	EPA 8260B
591786	2-Hexanone	BDL	3000	ug/kg	50	EPA 8260B
74884	Iodomethane	BDL	300	ug/kg	50	EPA 8260B
78933	2-Butanone	BDL	3000	ug/kg	50	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	3000	ug/kg	50	EPA 8260B
100425	Styrene	BDL	300	ug/kg	50	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	300	ug/kg	50	EPA 8260B
127184	Tetrachloroethene	BDL	300	ug/kg	50	EPA 8260B
108883	Toluene	BDL	120	ug/kg	50	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	120	ug/kg	50	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	120	ug/kg	50	EPA 8260B
79016	Trichloroethene	BDL	120	ug/kg	50	EPA 8260B
75694	Trichlorofluoromethane	BDL	300	ug/kg	50	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	120	ug/kg	50	EPA 8260B
108054	Vinyl acetate	BDL	600	ug/kg	50	EPA 8260B
75014	Vinyl chloride	BDL	60	ug/kg	50	EPA 8260B
1330207	Xylenes	BDL	300	ug/kg	50	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	400	ug/kg	1	EPA 8270C
95578	2-Chlorophenol	BDL	400	ug/kg	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	400	ug/kg	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	400	ug/kg	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	400	ug/kg	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	2000	ug/kg	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	2000	ug/kg	1	EPA 8270C
95487	2-Methylphenol	BDL	400	ug/kg	1	EPA 8270C
108394	3-Methylphenol	BDL	400	ug/kg	1	EPA 8270C
106445	4-Methylphenol	BDL	400	ug/kg	1	EPA 8270C
88755	2-Nitrophenol	BDL	400	ug/kg	1	EPA 8270C
100027	4-Nitrophenol	BDL	2000	ug/kg	1	EPA 8270C
87865	Pentachlorophenol	BDL	400	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0043, 06/21/99, 13:25, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108952	Phenol	BDL	400	ug/kg	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	400	ug/kg	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	400	ug/kg	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	400	ug/kg	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	400	ug/kg	1	EPA 8270C
208968	Acenaphthylene	BDL	400	ug/kg	1	EPA 8270C
120127	Anthracene	530	400	ug/kg	1	EPA 8270C
56553	Benzo(a)anthracene	1100	400	ug/kg	1	EPA 8270C
205992	Benzo(b)fluoranthene	1900	400	ug/kg	1	EPA 8270C
207089	Benzo(k)fluoranthene	1400	400	ug/kg	1	EPA 8270C
191242	Benzo(g,h,i)perylene	600	400	ug/kg	1	EPA 8270C
50328	Benzo(a)pyrene	1700	400	ug/kg	1	EPA 8270C
100516	Benzyl Alcohol	BDL	400	ug/kg	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	400	ug/kg	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	400	ug/kg	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	400	ug/kg	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	400	ug/kg	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	400	ug/kg	1	EPA 8270C
106478	p-Chloroaniline	BDL	400	ug/kg	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	400	ug/kg	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	400	ug/kg	1	EPA 8270C
218019	Chrysene	1300	400	ug/kg	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	400	ug/kg	1	EPA 8270C
132649	Dibenzofuran	BDL	400	ug/kg	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	400	ug/kg	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	400	ug/kg	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	400	ug/kg	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	400	ug/kg	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	2000	ug/kg	1	EPA 8270C
84662	Diethylphthalate	BDL	400	ug/kg	1	EPA 8270C
131113	Dimethylphthalate	BDL	400	ug/kg	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	400	ug/kg	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	400	ug/kg	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	400	ug/kg	1	EPA 8270C
206440	Fluoranthene	4600	400	ug/kg	1	EPA 8270C
86737	Fluorene	BDL	400	ug/kg	1	EPA 8270C
118741	Hexachlorobenzene	BDL	400	ug/kg	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	400	ug/kg	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	400	ug/kg	1	EPA 8270C
67721	Hexachloroethane	BDL	400	ug/kg	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	580	400	ug/kg	1	EPA 8270C
78591	Isophorone	BDL	400	ug/kg	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	400	ug/kg	1	EPA 8270C
91203	Naphthalene	BDL	400	ug/kg	1	EPA 8270C
88744	2-Nitroaniline	BDL	400	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Report No.: **109428-5** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0043, 06/21/99, 13:25, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
99092	3-Nitroaniline	BDL	400	ug/kg	1	EPA 8270C
100016	4-Nitroaniline	BDL	400	ug/kg	1	EPA 8270C
98953	Nitrobenzene	BDL	400	ug/kg	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	400	ug/kg	1	EPA 8270C
621647	N-Nitroso-di-n-propylamine	BDL	400	ug/kg	1	EPA 8270C
85018	Phenanthrene	2200	400	ug/kg	1	EPA 8270C
129000	Pyrene	2500	400	ug/kg	1	EPA 8270C
110861	Pyridine	BDL	400	ug/kg	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	400	ug/kg	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

Results reported on a dry weight basis

ASI
ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-6**

August 5, 1999

Sample Description

Sloss Industries
Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0042, 06/21/99, 13:55, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	General Chemistry					
57125	Total Cyanide	BDL	0.23	mg/kg	1	EPA 9014
	Moisture	12	0.04	%	1	
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	5.7	mg/kg	1	EPA 6010A
7440382	Total Arsenic	2.6	0.52	mg/kg	1	EPA 7060A
7440393	Total Barium	43	1.1	mg/kg	1	EPA 6010A
7440417	Total Beryllium	BDL	0.57	mg/kg	1	EPA 6010A
7440439	Total Cadmium	1.0	0.57	mg/kg	1	EPA 6010A
7440473	Total Chromium	3.8	1.1	mg/kg	1	EPA 6010A
7440508	Total Copper	5.9	2.3	mg/kg	1	EPA 6010A
7439921	Total Lead	BDL	2.8	mg/kg	1	EPA 6010A
7439976	Total Mercury	BDL	0.28	mg/kg	1	EPA 7471
7440020	Total Nickel	5.2	2.3	mg/kg	1	EPA 6010A
7782492	Total Selenium	BDL	0.52	mg/kg	1	EPA 7740
7440224	Total Silver	BDL	1.1	mg/kg	1	EPA 6010A
7440280	Total Thallium	BDL	0.10	mg/kg	1	EPA 7841
7440666	Total Zinc	23	2.3	mg/kg	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	2800	ug/kg	50	EPA 8260B
107028	Acrolein	BDL	2800	ug/kg	50	EPA 8260B
107131	Acrylonitrile	BDL	970	ug/kg	50	EPA 8260B
71432	Benzene	BDL	280	ug/kg	50	EPA 8260B
75274	Bromodichloromethane	BDL	280	ug/kg	50	EPA 8260B
75252	Bromoform	BDL	280	ug/kg	50	EPA 8260B
74839	Bromomethane	BDL	570	ug/kg	50	EPA 8260B
75150	Carbon disulfide	BDL	280	ug/kg	50	EPA 8260B
56235	Carbon tetrachloride	BDL	280	ug/kg	50	EPA 8260B
108907	Chlorobenzene	BDL	280	ug/kg	50	EPA 8260B
75003	Chloroethane	BDL	280	ug/kg	50	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	570	ug/kg	50	EPA 8260B
67663	Chloroform	BDL	280	ug/kg	50	EPA 8260B

BDL - Below Detection Limit
Results reported on a dry weight basis

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0042, 06/21/99, 13:55, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
74873	Chloromethane	BDL	570	ug/kg	50	EPA 8260B
124481	Dibromochloromethane	BDL	280	ug/kg	50	EPA 8260B
106934	1,2-Dibromoethane	BDL	110	ug/kg	50	EPA 8260B
74953	Dibromomethane	BDL	110	ug/kg	50	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	570	ug/kg	50	EPA 8260B
75718	Dichlorodifluoromethane	BDL	280	ug/kg	50	EPA 8260B
75343	1,1-Dichloroethane	BDL	280	ug/kg	50	EPA 8260B
107062	1,2-Dichloroethane	BDL	280	ug/kg	50	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	280	ug/kg	50	EPA 8260B
75354	1,1-Dichloroethene	BDL	280	ug/kg	50	EPA 8260B
75092	Methylene chloride	BDL	280	ug/kg	50	EPA 8260B
78875	1,2-Dichloropropane	BDL	280	ug/kg	50	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	280	ug/kg	50	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	280	ug/kg	50	EPA 8260B
100414	Ethylbenzene	BDL	280	ug/kg	50	EPA 8260B
97632	Ethyl methacrylate	BDL	280	ug/kg	50	EPA 8260B
591786	2-Hexanone	BDL	2800	ug/kg	50	EPA 8260B
74884	Iodomethane	BDL	280	ug/kg	50	EPA 8260B
78933	2-Butanone	BDL	2800	ug/kg	50	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	2800	ug/kg	50	EPA 8260B
100425	Styrene	BDL	280	ug/kg	50	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	280	ug/kg	50	EPA 8260B
127184	Tetrachloroethene	BDL	280	ug/kg	50	EPA 8260B
108883	Toluene	BDL	110	ug/kg	50	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	110	ug/kg	50	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	110	ug/kg	50	EPA 8260B
79016	Trichloroethene	BDL	110	ug/kg	50	EPA 8260B
75694	Trichlorofluoromethane	BDL	280	ug/kg	50	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	110	ug/kg	50	EPA 8260B
108054	Vinyl acetate	BDL	570	ug/kg	50	EPA 8260B
75014	Vinyl chloride	BDL	57	ug/kg	50	EPA 8260B
1330207	Xylenes	BDL	280	ug/kg	50	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	380	ug/kg	1	EPA 8270C
95578	2-Chlorophenol	BDL	380	ug/kg	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	380	ug/kg	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	380	ug/kg	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	380	ug/kg	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	1900	ug/kg	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	1900	ug/kg	1	EPA 8270C
95487	2-Methylphenol	BDL	380	ug/kg	1	EPA 8270C
108394	3-Methylphenol	BDL	380	ug/kg	1	EPA 8270C
106445	4-Methylphenol	BDL	380	ug/kg	1	EPA 8270C
88755	2-Nitrophenol	BDL	380	ug/kg	1	EPA 8270C
100027	4-Nitrophenol	BDL	1900	ug/kg	1	EPA 8270C
87865	Pentachlorophenol	BDL	380	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0042, 06/21/99, 13:55, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108952	Phenol	BDL	380	ug/kg	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	380	ug/kg	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	380	ug/kg	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	380	ug/kg	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	380	ug/kg	1	EPA 8270C
208968	Acenaphthylene	BDL	380	ug/kg	1	EPA 8270C
120127	Anthracene	BDL	380	ug/kg	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	380	ug/kg	1	EPA 8270C
205992	Benzo(b)fluoranthene	470	380	ug/kg	1	EPA 8270C
207089	Benzo(k)fluoranthene	400	380	ug/kg	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	380	ug/kg	1	EPA 8270C
50328	Benzo(a)pyrene	450	380	ug/kg	1	EPA 8270C
100516	Benzyl Alcohol	BDL	380	ug/kg	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	380	ug/kg	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	380	ug/kg	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	380	ug/kg	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	380	ug/kg	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	380	ug/kg	1	EPA 8270C
106478	p-Chloroaniline	BDL	380	ug/kg	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	380	ug/kg	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	380	ug/kg	1	EPA 8270C
218019	Chrysene	410	380	ug/kg	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	380	ug/kg	1	EPA 8270C
132649	Dibenzofuran	BDL	380	ug/kg	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	380	ug/kg	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	380	ug/kg	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	380	ug/kg	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	380	ug/kg	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	1900	ug/kg	1	EPA 8270C
84662	Diethylphthalate	BDL	380	ug/kg	1	EPA 8270C
131113	Dimethylphthalate	BDL	380	ug/kg	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	380	ug/kg	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	380	ug/kg	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	380	ug/kg	1	EPA 8270C
206440	Fluoranthene	1100	380	ug/kg	1	EPA 8270C
86737	Fluorene	BDL	380	ug/kg	1	EPA 8270C
118741	Hexachlorobenzene	BDL	380	ug/kg	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	380	ug/kg	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	380	ug/kg	1	EPA 8270C
67721	Hexachloroethane	BDL	380	ug/kg	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	380	ug/kg	1	EPA 8270C
78591	Isophorone	BDL	380	ug/kg	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	380	ug/kg	1	EPA 8270C
91203	Naphthalene	BDL	380	ug/kg	1	EPA 8270C
88744	2-Nitroaniline	BDL	380	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Report No.: **109428-6** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0042, 06/21/99, 13:55, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
99092	3-Nitroaniline	BDL	380	ug/kg	1	EPA 8270C
100016	4-Nitroaniline	BDL	380	ug/kg	1	EPA 8270C
98953	Nitrobenzene	BDL	380	ug/kg	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	380	ug/kg	1	EPA 8270C
621647	N-Nitroso-di-n-propylamine	BDL	380	ug/kg	1	EPA 8270C
85018	Phenanthrene	550	380	ug/kg	1	EPA 8270C
129000	Pyrene	670	380	ug/kg	1	EPA 8270C
110861	Pyridine	BDL	380	ug/kg	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	380	ug/kg	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

Results reported on a dry weight basis

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-7**

August 5, 1999

Sample Description

Sloss Industries
Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0041, 06/21/99, 14:00, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	General Chemistry					
57125	Total Cyanide	4.2	0.26	mg/kg	1	EPA 9014
	Moisture	24	0.04	%	1	
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	6.6	mg/kg	1	EPA 6010A
440382	Total Arsenic	9.6	0.60	mg/kg	1	EPA 7060A
7440393	Total Barium	500	1.3	mg/kg	1	EPA 6010A
7440417	Total Beryllium	BDL	0.66	mg/kg	1	EPA 6010A
7440439	Total Cadmium	2.5	0.66	mg/kg	1	EPA 6010A
7440473	Total Chromium	15	1.3	mg/kg	1	EPA 6010A
7440508	Total Copper	20	2.4	mg/kg	1	EPA 6010A
7439921	Total Lead	35	3.3	mg/kg	1	EPA 6010A
7439976	Total Mercury	1.0	0.33	mg/kg	1	EPA 7471
7440020	Total Nickel	12	2.6	mg/kg	1	EPA 6010A
7782492	Total Selenium	BDL	0.60	mg/kg	1	EPA 7740
7440224	Total Silver	BDL	1.3	mg/kg	1	EPA 6010A
7440280	Total Thallium	BDL	0.12	mg/kg	1	EPA 7841
7440666	Total Zinc	89	2.6	mg/kg	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	3300	ug/kg	50	EPA 8260B
107028	Acrolein	BDL	3300	ug/kg	50	EPA 8260B
107131	Acrylonitrile	BDL	1100	ug/kg	50	EPA 8260B
71432	Benzene	BDL	330	ug/kg	50	EPA 8260B
75274	Bromodichloromethane	BDL	330	ug/kg	50	EPA 8260B
75252	Bromoform	BDL	330	ug/kg	50	EPA 8260B
74839	Bromomethane	BDL	660	ug/kg	50	EPA 8260B
75150	Carbon disulfide	BDL	330	ug/kg	50	EPA 8260B
56235	Carbon tetrachloride	BDL	330	ug/kg	50	EPA 8260B
108907	Chlorobenzene	BDL	330	ug/kg	50	EPA 8260B
75003	Chloroethane	BDL	330	ug/kg	50	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	660	ug/kg	50	EPA 8260B
67663	Chloroform	BDL	330	ug/kg	50	EPA 8260B

BDL - Below Detection Limit
Results reported on a dry weight basis

Report No.: **109428-7** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0041, 06/21/99, 14:00, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
74873	Chloromethane	BDL	660	ug/kg	50	EPA 8260B
124481	Dibromochloromethane	BDL	330	ug/kg	50	EPA 8260B
106934	1,2-Dibromoethane	BDL	130	ug/kg	50	EPA 8260B
74953	Dibromomethane	BDL	130	ug/kg	50	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	660	ug/kg	50	EPA 8260B
75718	Dichlorodifluoromethane	BDL	330	ug/kg	50	EPA 8260B
75343	1,1-Dichloroethane	BDL	330	ug/kg	50	EPA 8260B
107062	1,2-Dichloroethane	BDL	330	ug/kg	50	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	330	ug/kg	50	EPA 8260B
75354	1,1-Dichloroethene	BDL	330	ug/kg	50	EPA 8260B
75092	Methylene chloride	BDL	330	ug/kg	50	EPA 8260B
78875	1,2-Dichloropropane	BDL	330	ug/kg	50	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	330	ug/kg	50	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	330	ug/kg	50	EPA 8260B
100414	Ethylbenzene	BDL	330	ug/kg	50	EPA 8260B
97632	Ethyl methacrylate	BDL	330	ug/kg	50	EPA 8260B
591786	2-Hexanone	BDL	3300	ug/kg	50	EPA 8260B
74884	Iodomethane	BDL	330	ug/kg	50	EPA 8260B
78933	2-Butanone	BDL	3300	ug/kg	50	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	3300	ug/kg	50	EPA 8260B
100425	Styrene	BDL	330	ug/kg	50	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	330	ug/kg	50	EPA 8260B
127184	Tetrachloroethene	BDL	330	ug/kg	50	EPA 8260B
108883	Toluene	250	130	ug/kg	50	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	130	ug/kg	50	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	130	ug/kg	50	EPA 8260B
79016	Trichloroethene	BDL	130	ug/kg	50	EPA 8260B
75694	Trichlorofluoromethane	BDL	330	ug/kg	50	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	130	ug/kg	50	EPA 8260B
108054	Vinyl acetate	BDL	660	ug/kg	50	EPA 8260B
75014	Vinyl chloride	BDL	66	ug/kg	50	EPA 8260B
1330207	Xylenes	680	330	ug/kg	50	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	430	ug/kg	1	EPA 8270C
95578	2-Chlorophenol	BDL	430	ug/kg	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	430	ug/kg	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	430	ug/kg	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	430	ug/kg	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	2200	ug/kg	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	2200	ug/kg	1	EPA 8270C
95487	2-Methylphenol	BDL	430	ug/kg	1	EPA 8270C
108394	3-Methylphenol	BDL	430	ug/kg	1	EPA 8270C
106445	4-Methylphenol	BDL	430	ug/kg	1	EPA 8270C
88755	2-Nitrophenol	BDL	430	ug/kg	1	EPA 8270C
100027	4-Nitrophenol	BDL	2200	ug/kg	1	EPA 8270C
87865	Pentachlorophenol	BDL	430	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Report No.: **109428-7** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0041, 06/21/99, 14:00, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108952	Phenol	BDL	430	ug/kg	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	430	ug/kg	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	430	ug/kg	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	430	ug/kg	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	22000	4300	ug/kg	10	EPA 8270C
208968	Acenaphthylene	1300	430	ug/kg	1	EPA 8270C
120127	Anthracene	6400	4300	ug/kg	10	EPA 8270C
56553	Benzo(a)anthracene	13000	4300	ug/kg	10	EPA 8270C
205992	Benzo(b)fluoranthene	9700	4300	ug/kg	10	EPA 8270C
207089	Benzo(k)fluoranthene	14000	4300	ug/kg	10	EPA 8270C
191242	Benzo(g,h,i)perylene	3000	430	ug/kg	1	EPA 8270C
50328	Benzo(a)pyrene	13000	4300	ug/kg	10	EPA 8270C
100516	Benzyl Alcohol	BDL	430	ug/kg	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	430	ug/kg	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	430	ug/kg	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	430	ug/kg	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	430	ug/kg	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	430	ug/kg	1	EPA 8270C
06478	p-Chloroaniline	BDL	430	ug/kg	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	430	ug/kg	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	430	ug/kg	1	EPA 8270C
218019	Chrysene	12000	4300	ug/kg	10	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	430	ug/kg	1	EPA 8270C
132649	Dibenzofuran	13000	4300	ug/kg	10	EPA 8270C
84742	Di-n-butylphthalate	BDL	430	ug/kg	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	430	ug/kg	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	430	ug/kg	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	430	ug/kg	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	2200	ug/kg	1	EPA 8270C
84662	Diethylphthalate	BDL	430	ug/kg	1	EPA 8270C
131113	Dimethylphthalate	BDL	430	ug/kg	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	430	ug/kg	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	430	ug/kg	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	430	ug/kg	1	EPA 8270C
206440	Fluoranthene	38000	4300	ug/kg	10	EPA 8270C
86737	Fluorene	22000	4300	ug/kg	10	EPA 8270C
118741	Hexachlorobenzene	BDL	430	ug/kg	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	430	ug/kg	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	430	ug/kg	1	EPA 8270C
67721	Hexachloroethane	BDL	430	ug/kg	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	3400	430	ug/kg	1	EPA 8270C
78591	Isophorone	BDL	430	ug/kg	1	EPA 8270C
91576	2-Methylnaphthalene	24000	4300	ug/kg	10	EPA 8270C
91203	Naphthalene	82000	4300	ug/kg	10	EPA 8270C
88744	2-Nitroaniline	BDL	430	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Report No.: **109428-7** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0041, 06/21/99, 14:00, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
99092	3-Nitroaniline	BDL	430	ug/kg	1	EPA 8270C
100016	4-Nitroaniline	BDL	430	ug/kg	1	EPA 8270C
98953	Nitrobenzene	BDL	430	ug/kg	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	430	ug/kg	1	EPA 8270C
621647	N-Nitroso-di-n-propylamine	BDL	430	ug/kg	1	EPA 8270C
85018	Phenanthrene	49000	4300	ug/kg	10	EPA 8270C
129000	Pyrene	21000	4300	ug/kg	10	EPA 8270C
110861	Pyridine	BDL	430	ug/kg	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	430	ug/kg	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

Results reported on a dry weight basis

ASI ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis

110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-8**

August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0038, 06/21/99, 14:35, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
		General Chemistry				
57125	Total Cyanide	0.38	0.24	mg/kg	1	EPA 9014
	Moisture	17	0.04	%	1	
		Priority Pollutant Metals				
		Metals				
7440360	Total Antimony	BDL	6.0	mg/kg	1	EPA 6010A
7440382	Total Arsenic	3.1	1.1	mg/kg	1	EPA 7060A
7440393	Total Barium	24	1.2	mg/kg	1	EPA 6010A
7440417	Total Beryllium	BDL	0.6	mg/kg	1	EPA 6010A
7440439	Total Cadmium	2.5	0.6	mg/kg	1	EPA 6010A
7440473	Total Chromium	16	1.2	mg/kg	1	EPA 6010A
7440508	Total Copper	6.0	2.4	mg/kg	1	EPA 6010A
7439921	Total Lead	4.3	3.0	mg/kg	1	EPA 6010A
7439976	Total Mercury	BDL	0.30	mg/kg	1	EPA 7471
7440020	Total Nickel	4.7	2.4	mg/kg	1	EPA 6010A
7782492	Total Selenium	BDL	1.1	mg/kg	1	EPA 7740
7440224	Total Silver	BDL	1.2	mg/kg	1	EPA 6010A
7440280	Total Thallium	BDL	0.23	mg/kg	1	EPA 7841
7440666	Total Zinc	24	2.4	mg/kg	1	EPA 6010A
		Volatile Organics (EPA 8260B)				
67641	Acetone	BDL	3000	ug/kg	50	EPA 8260B
107028	Acrolein	BDL	3000	ug/kg	50	EPA 8260B
107131	Acrylonitrile	BDL	1000	ug/kg	50	EPA 8260B
71432	Benzene	BDL	300	ug/kg	50	EPA 8260B
75274	Bromodichloromethane	BDL	300	ug/kg	50	EPA 8260B
75252	Bromoform	BDL	300	ug/kg	50	EPA 8260B
74839	Bromomethane	BDL	600	ug/kg	50	EPA 8260B
75150	Carbon disulfide	BDL	300	ug/kg	50	EPA 8260B
56235	Carbon tetrachloride	BDL	300	ug/kg	50	EPA 8260B
108907	Chlorobenzene	BDL	300	ug/kg	50	EPA 8260B
75003	Chloroethane	BDL	300	ug/kg	50	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	600	ug/kg	50	EPA 8260B
67663	Chloroform	BDL	300	ug/kg	50	EPA 8260B

BDL - Below Detection Limit
Results reported on a dry weight basis

Report No.: **109428-8** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0038, 06/21/99, 14:35, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
74873	Chloromethane	BDL	600	ug/kg	50	EPA 8260B
124481	Dibromochloromethane	BDL	300	ug/kg	50	EPA 8260B
106934	1,2-Dibromoethane	BDL	120	ug/kg	50	EPA 8260B
74953	Dibromomethane	BDL	120	ug/kg	50	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	600	ug/kg	50	EPA 8260B
75718	Dichlorodifluoromethane	BDL	300	ug/kg	50	EPA 8260B
75343	1,1-Dichloroethane	BDL	300	ug/kg	50	EPA 8260B
107062	1,2-Dichloroethane	BDL	300	ug/kg	50	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	300	ug/kg	50	EPA 8260B
75354	1,1-Dichloroethene	BDL	300	ug/kg	50	EPA 8260B
75092	Methylene chloride	BDL	300	ug/kg	50	EPA 8260B
78875	1,2-Dichloropropane	BDL	300	ug/kg	50	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	300	ug/kg	50	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	300	ug/kg	50	EPA 8260B
100414	Ethylbenzene	BDL	300	ug/kg	50	EPA 8260B
97632	Ethyl methacrylate	BDL	300	ug/kg	50	EPA 8260B
591786	2-Hexanone	BDL	3000	ug/kg	50	EPA 8260B
74884	Iodomethane	BDL	300	ug/kg	50	EPA 8260B
78933	2-Butanone	BDL	3000	ug/kg	50	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	3000	ug/kg	50	EPA 8260B
100425	Styrene	BDL	300	ug/kg	50	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	300	ug/kg	50	EPA 8260B
127184	Tetrachloroethene	BDL	300	ug/kg	50	EPA 8260B
108883	Toluene	BDL	120	ug/kg	50	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	120	ug/kg	50	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	120	ug/kg	50	EPA 8260B
79016	Trichloroethene	BDL	120	ug/kg	50	EPA 8260B
75694	Trichlorofluoromethane	BDL	300	ug/kg	50	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	120	ug/kg	50	EPA 8260B
108054	Vinyl acetate	BDL	600	ug/kg	50	EPA 8260B
75014	Vinyl chloride	BDL	60	ug/kg	50	EPA 8260B
1330207	Xylenes	BDL	300	ug/kg	50	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	400	ug/kg	1	EPA 8270C
95578	2-Chlorophenol	BDL	400	ug/kg	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	400	ug/kg	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	400	ug/kg	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	400	ug/kg	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	2000	ug/kg	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	2000	ug/kg	1	EPA 8270C
95487	2-Methylphenol	BDL	400	ug/kg	1	EPA 8270C
108394	3-Methylphenol	BDL	400	ug/kg	1	EPA 8270C
106445	4-Methylphenol	BDL	400	ug/kg	1	EPA 8270C
88755	2-Nitrophenol	BDL	400	ug/kg	1	EPA 8270C
100027	4-Nitrophenol	BDL	2000	ug/kg	1	EPA 8270C
87865	Pentachlorophenol	BDL	400	ug/kg	1	EPA 8270C

BDL - Below Detection Limit
Results reported on a dry weight basis

Report No.: **109428-8** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0038, 06/21/99, 14:35, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108952	Phenol	BDL	400	ug/kg	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	400	ug/kg	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	400	ug/kg	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	400	ug/kg	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	520	400	ug/kg	1	EPA 8270C
208968	Acenaphthylene	BDL	400	ug/kg	1	EPA 8270C
120127	Anthracene	530	400	ug/kg	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	400	ug/kg	1	EPA 8270C
205992	Benzo(b)fluoranthene	420	400	ug/kg	1	EPA 8270C
207089	Benzo(k)fluoranthene	470	400	ug/kg	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	400	ug/kg	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	400	ug/kg	1	EPA 8270C
100516	Benzyl Alcohol	BDL	400	ug/kg	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	400	ug/kg	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	400	ug/kg	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	400	ug/kg	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	400	ug/kg	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	400	ug/kg	1	EPA 8270C
106478	p-Chloroaniline	BDL	400	ug/kg	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	400	ug/kg	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	400	ug/kg	1	EPA 8270C
218019	Chrysene	BDL	400	ug/kg	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	400	ug/kg	1	EPA 8270C
132649	Dibenzofuran	540	400	ug/kg	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	400	ug/kg	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	400	ug/kg	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	400	ug/kg	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	400	ug/kg	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	2000	ug/kg	1	EPA 8270C
84662	Diethylphthalate	BDL	400	ug/kg	1	EPA 8270C
131113	Dimethylphthalate	BDL	400	ug/kg	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	400	ug/kg	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	400	ug/kg	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	400	ug/kg	1	EPA 8270C
206440	Fluoranthene	2200	400	ug/kg	1	EPA 8270C
86737	Fluorene	900	400	ug/kg	1	EPA 8270C
118741	Hexachlorobenzene	BDL	400	ug/kg	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	400	ug/kg	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	400	ug/kg	1	EPA 8270C
67721	Hexachloroethane	BDL	400	ug/kg	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	400	ug/kg	1	EPA 8270C
78591	Isophorone	BDL	400	ug/kg	1	EPA 8270C
91576	2-Methylnaphthalene	690	400	ug/kg	1	EPA 8270C
91203	Naphthalene	3700	400	ug/kg	1	EPA 8270C
88744	2-Nitroaniline	BDL	400	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Report No.: **109428-8** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0038, 06/21/99, 14:35, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
99092	3-Nitroaniline	BDL	400	ug/kg	1	EPA 8270C
100016	4-Nitroaniline	BDL	400	ug/kg	1	EPA 8270C
98953	Nitrobenzene	BDL	400	ug/kg	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	400	ug/kg	1	EPA 8270C
621647	N-Nitroso-di-n-propylamine	BDL	400	ug/kg	1	EPA 8270C
85018	Phenanthrene	2500	400	ug/kg	1	EPA 8270C
129000	Pyrene	1200	400	ug/kg	1	EPA 8270C
110861	Pyridine	BDL	400	ug/kg	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	400	ug/kg	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

Results reported on a dry weight basis

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-9**

August 5, 1999

Sample Description
Sloss Industries
Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0039, 06/21/99, 15:15, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
			General Chemistry			
57125	Total Cyanide	0.37	0.30	mg/kg	1	EPA 9014
	Moisture	33	0.04	%	1	
			Priority Pollutant Metals			
			Metals			
7440360	Total Antimony	BDL	7.5	mg/kg	1	EPA 6010A
7440382	Total Arsenic	5.0	0.71	mg/kg	1	EPA 7060A
7440393	Total Barium	17	1.5	mg/kg	1	EPA 6010A
7440417	Total Beryllium	BDL	0.75	mg/kg	1	EPA 6010A
7440439	Total Cadmium	2.2	0.75	mg/kg	1	EPA 6010A
7440473	Total Chromium	11	1.5	mg/kg	1	EPA 6010A
7440508	Total Copper	5.8	3.0	mg/kg	1	EPA 6010A
7439921	Total Lead	6.8	3.7	mg/kg	1	EPA 6010A
7439976	Total Mercury	BDL	0.37	mg/kg	1	EPA 7471
7440020	Total Nickel	4.8	3.0	mg/kg	1	EPA 6010A
7782492	Total Selenium	BDL	0.71	mg/kg	1	EPA 7740
7440224	Total Silver	BDL	1.5	mg/kg	1	EPA 6010A
7440280	Total Thallium	BDL	0.14	mg/kg	1	EPA 7841
7440666	Total Zinc	35	3.0	mg/kg	1	EPA 6010A
			Volatile Organics (EPA 8260B)			
67641	Acetone	BDL	3700	ug/kg	50	EPA 8260B
107028	Acrolein	BDL	3700	ug/kg	50	EPA 8260B
107131	Acrylonitrile	BDL	1300	ug/kg	50	EPA 8260B
71432	Benzene	BDL	370	ug/kg	50	EPA 8260B
75274	Bromodichloromethane	BDL	370	ug/kg	50	EPA 8260B
75252	Bromoform	BDL	370	ug/kg	50	EPA 8260B
74839	Bromomethane	BDL	750	ug/kg	50	EPA 8260B
75150	Carbon disulfide	BDL	370	ug/kg	50	EPA 8260B
56235	Carbon tetrachloride	BDL	370	ug/kg	50	EPA 8260B
108907	Chlorobenzene	BDL	370	ug/kg	50	EPA 8260B
75003	Chloroethane	BDL	370	ug/kg	50	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	750	ug/kg	50	EPA 8260B
67663	Chloroform	BDL	370	ug/kg	50	EPA 8260B

BDL - Below Detection Limit
Results reported on a dry weight basis

Report No.: **109428-9** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0039, 06/21/99, 15:15, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
74873	Chloromethane	BDL	750	ug/kg	50	EPA 8260B
124481	Dibromochloromethane	BDL	370	ug/kg	50	EPA 8260B
106934	1,2-Dibromoethane	BDL	150	ug/kg	50	EPA 8260B
74953	Dibromomethane	BDL	150	ug/kg	50	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	750	ug/kg	50	EPA 8260B
75718	Dichlorodifluoromethane	BDL	370	ug/kg	50	EPA 8260B
75343	1,1-Dichloroethane	BDL	370	ug/kg	50	EPA 8260B
107062	1,2-Dichloroethane	BDL	370	ug/kg	50	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	370	ug/kg	50	EPA 8260B
75354	1,1-Dichloroethene	BDL	370	ug/kg	50	EPA 8260B
75092	Methylene chloride	BDL	370	ug/kg	50	EPA 8260B
78875	1,2-Dichloropropane	BDL	370	ug/kg	50	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	370	ug/kg	50	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	370	ug/kg	50	EPA 8260B
100414	Ethylbenzene	BDL	370	ug/kg	50	EPA 8260B
97632	Ethyl methacrylate	BDL	370	ug/kg	50	EPA 8260B
591786	2-Hexanone	BDL	3700	ug/kg	50	EPA 8260B
74884	Iodomethane	BDL	370	ug/kg	50	EPA 8260B
78933	2-Butanone	BDL	3700	ug/kg	50	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	3700	ug/kg	50	EPA 8260B
100425	Styrene	BDL	370	ug/kg	50	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	370	ug/kg	50	EPA 8260B
127184	Tetrachloroethene	BDL	370	ug/kg	50	EPA 8260B
108883	Toluene	BDL	150	ug/kg	50	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	150	ug/kg	50	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	150	ug/kg	50	EPA 8260B
79016	Trichloroethene	BDL	150	ug/kg	50	EPA 8260B
75694	Trichlorofluoromethane	BDL	370	ug/kg	50	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	150	ug/kg	50	EPA 8260B
108054	Vinyl acetate	BDL	750	ug/kg	50	EPA 8260B
75014	Vinyl chloride	BDL	75	ug/kg	50	EPA 8260B
1330207	Xylenes	BDL	370	ug/kg	50	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	490	ug/kg	1	EPA 8270C
95578	2-Chlorophenol	BDL	490	ug/kg	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	490	ug/kg	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	490	ug/kg	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	490	ug/kg	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	2500	ug/kg	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	2500	ug/kg	1	EPA 8270C
95487	2-Methylphenol	BDL	490	ug/kg	1	EPA 8270C
108394	3-Methylphenol	BDL	490	ug/kg	1	EPA 8270C
106445	4-Methylphenol	BDL	490	ug/kg	1	EPA 8270C
88755	2-Nitrophenol	BDL	490	ug/kg	1	EPA 8270C
100027	4-Nitrophenol	BDL	2500	ug/kg	1	EPA 8270C
87865	Pentachlorophenol	BDL	490	ug/kg	1	EPA 8270C

BDL - Below Detection Limit
Results reported on a dry weight basis

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0039, 06/21/99, 15:15, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108952	Phenol	BDL	490	ug/kg	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	490	ug/kg	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	490	ug/kg	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	490	ug/kg	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	490	ug/kg	1	EPA 8270C
208968	Acenaphthylene	BDL	490	ug/kg	1	EPA 8270C
120127	Anthracene	BDL	490	ug/kg	1	EPA 8270C
56553	Benzo(a)anthracene	550	490	ug/kg	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	490	ug/kg	1	EPA 8270C
207089	Benzo(k)fluoranthene	600	490	ug/kg	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	490	ug/kg	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	490	ug/kg	1	EPA 8270C
100516	Benzyl Alcohol	BDL	490	ug/kg	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	490	ug/kg	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	490	ug/kg	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	490	ug/kg	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	490	ug/kg	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	490	ug/kg	1	EPA 8270C
106478	p-Chloroaniline	BDL	490	ug/kg	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	490	ug/kg	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	490	ug/kg	1	EPA 8270C
218019	Chrysene	500	490	ug/kg	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	490	ug/kg	1	EPA 8270C
132649	Dibenzofuran	BDL	490	ug/kg	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	490	ug/kg	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	490	ug/kg	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	490	ug/kg	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	490	ug/kg	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	2500	ug/kg	1	EPA 8270C
84662	Diethylphthalate	BDL	490	ug/kg	1	EPA 8270C
131113	Dimethylphthalate	BDL	490	ug/kg	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	490	ug/kg	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	490	ug/kg	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	490	ug/kg	1	EPA 8270C
206440	Fluoranthene	1500	490	ug/kg	1	EPA 8270C
86737	Fluorene	BDL	490	ug/kg	1	EPA 8270C
118741	Hexachlorobenzene	BDL	490	ug/kg	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	490	ug/kg	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	490	ug/kg	1	EPA 8270C
67721	Hexachloroethane	BDL	490	ug/kg	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	490	ug/kg	1	EPA 8270C
78591	Isophorone	BDL	490	ug/kg	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	490	ug/kg	1	EPA 8270C
91203	Naphthalene	BDL	490	ug/kg	1	EPA 8270C
88744	2-Nitroaniline	BDL	490	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Report No.: **109428-9** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0039, 06/21/99, 15:15, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
99092	3-Nitroaniline	BDL	490	ug/kg	1	EPA 8270C
100016	4-Nitroaniline	BDL	490	ug/kg	1	EPA 8270C
98953	Nitrobenzene	BDL	490	ug/kg	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	490	ug/kg	1	EPA 8270C
621647	N-Nitroso-di-n-propylamine	BDL	490	ug/kg	1	EPA 8270C
85018	Phenanthrene	960	490	ug/kg	1	EPA 8270C
129000	Pyrene	820	490	ug/kg	1	EPA 8270C
110861	Pyridine	BDL	490	ug/kg	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	490	ug/kg	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit
Results reported on a dry weight basis

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-10**

August 5, 1999

Sample Description

Sloss Industries
Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0040, 06/21/99, 16:10, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
		General Chemistry				
57125	Total Cyanide	BDL	0.28	mg/kg	1	EPA 9014
	Moisture	29	0.04	%	1	
		Priority Pollutant Metals				
		Metals				
7440360	Total Antimony	BDL	7.0	mg/kg	1	EPA 6010A
7440382	Total Arsenic	5.4	0.67	mg/kg	1	EPA 7060A
7440393	Total Barium	22	1.4	mg/kg	1	EPA 6010A
7440417	Total Beryllium	BDL	0.7	mg/kg	1	EPA 6010A
7440439	Total Cadmium	2.4	0.7	mg/kg	1	EPA 6010A
7440473	Total Chromium	14	1.4	mg/kg	1	EPA 6010A
7440508	Total Copper	5.5	2.8	mg/kg	1	EPA 6010A
7439921	Total Lead	5.7	3.5	mg/kg	1	EPA 6010A
7439976	Total Mercury	BDL	0.35	mg/kg	1	EPA 7471
7440020	Total Nickel	5.7	2.8	mg/kg	1	EPA 6010A
7782492	Total Selenium	BDL	0.67	mg/kg	1	EPA 7740
7440224	Total Silver	BDL	1.4	mg/kg	1	EPA 6010A
7440280	Total Thallium	BDL	0.13	mg/kg	1	EPA 7841
7440666	Total Zinc	29	2.8	mg/kg	1	EPA 6010A
		Volatile Organics (EPA 8260B)				
67641	Acetone	BDL	3500	ug/kg	50	EPA 8260B
107028	Acrolein	BDL	3500	ug/kg	50	EPA 8260B
107131	Acrylonitrile	BDL	1200	ug/kg	50	EPA 8260B
71432	Benzene	BDL	350	ug/kg	50	EPA 8260B
75274	Bromodichloromethane	BDL	350	ug/kg	50	EPA 8260B
75252	Bromoform	BDL	350	ug/kg	50	EPA 8260B
74839	Bromomethane	BDL	700	ug/kg	50	EPA 8260B
75150	Carbon disulfide	BDL	350	ug/kg	50	EPA 8260B
56235	Carbon tetrachloride	BDL	350	ug/kg	50	EPA 8260B
108907	Chlorobenzene	BDL	350	ug/kg	50	EPA 8260B
75003	Chloroethane	BDL	350	ug/kg	50	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	700	ug/kg	50	EPA 8260B
67663	Chloroform	BDL	350	ug/kg	50	EPA 8260B

BDL - Below Detection Limit
Results reported on a dry weight basis

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0040, 06/21/99, 16:10, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
74873	Chloromethane	BDL	700	ug/kg	50	EPA 8260B
124481	Dibromochloromethane	BDL	350	ug/kg	50	EPA 8260B
106934	1,2-Dibromoethane	BDL	140	ug/kg	50	EPA 8260B
74953	Dibromomethane	BDL	140	ug/kg	50	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	700	ug/kg	50	EPA 8260B
75718	Dichlorodifluoromethane	BDL	350	ug/kg	50	EPA 8260B
75343	1,1-Dichloroethane	BDL	350	ug/kg	50	EPA 8260B
107062	1,2-Dichloroethane	BDL	350	ug/kg	50	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	350	ug/kg	50	EPA 8260B
75354	1,1-Dichloroethene	BDL	350	ug/kg	50	EPA 8260B
75092	Methylene chloride	BDL	350	ug/kg	50	EPA 8260B
78875	1,2-Dichloropropane	BDL	350	ug/kg	50	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	350	ug/kg	50	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	350	ug/kg	50	EPA 8260B
100414	Ethylbenzene	BDL	350	ug/kg	50	EPA 8260B
97632	Ethyl methacrylate	BDL	350	ug/kg	50	EPA 8260B
591786	2-Hexanone	BDL	3500	ug/kg	50	EPA 8260B
74884	Iodomethane	BDL	350	ug/kg	50	EPA 8260B
78933	2-Butanone	BDL	3500	ug/kg	50	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	3500	ug/kg	50	EPA 8260B
100425	Styrene	BDL	350	ug/kg	50	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	350	ug/kg	50	EPA 8260B
127184	Tetrachloroethene	BDL	350	ug/kg	50	EPA 8260B
108883	Toluene	BDL	140	ug/kg	50	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	140	ug/kg	50	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	140	ug/kg	50	EPA 8260B
79016	Trichloroethene	BDL	140	ug/kg	50	EPA 8260B
75694	Trichlorofluoromethane	BDL	350	ug/kg	50	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	140	ug/kg	50	EPA 8260B
108054	Vinyl acetate	BDL	700	ug/kg	50	EPA 8260B
75014	Vinyl chloride	BDL	70	ug/kg	50	EPA 8260B
1330207	Xylenes	BDL	350	ug/kg	50	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	460	ug/kg	1	EPA 8270C
95578	2-Chlorophenol	BDL	460	ug/kg	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	460	ug/kg	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	460	ug/kg	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	460	ug/kg	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	2400	ug/kg	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	2400	ug/kg	1	EPA 8270C
95487	2-Methylphenol	BDL	460	ug/kg	1	EPA 8270C
108394	3-Methylphenol	BDL	460	ug/kg	1	EPA 8270C
106445	4-Methylphenol	BDL	460	ug/kg	1	EPA 8270C
88755	2-Nitrophenol	BDL	460	ug/kg	1	EPA 8270C
100027	4-Nitrophenol	BDL	2400	ug/kg	1	EPA 8270C
87865	Pentachlorophenol	BDL	460	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0040, 06/21/99, 16:10, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108952	Phenol	BDL	460	ug/kg	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	460	ug/kg	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	460	ug/kg	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	460	ug/kg	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	550	460	ug/kg	1	EPA 8270C
208968	Acenaphthylene	790	460	ug/kg	1	EPA 8270C
120127	Anthracene	2300	460	ug/kg	1	EPA 8270C
56553	Benzo(a)anthracene	3700	460	ug/kg	1	EPA 8270C
205992	Benzo(b)fluoranthene	4600	4600	ug/kg	10	EPA 8270C
207089	Benzo(k)fluoranthene	4500	460	ug/kg	1	EPA 8270C
191242	Benzo(g,h,i)perylene	1200	460	ug/kg	1	EPA 8270C
50328	Benzo(a)pyrene	5500	4600	ug/kg	10	EPA 8270C
100516	Benzyl Alcohol	BDL	460	ug/kg	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	460	ug/kg	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	460	ug/kg	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	460	ug/kg	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	460	ug/kg	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	460	ug/kg	1	EPA 8270C
106478	p-Chloroaniline	BDL	460	ug/kg	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	460	ug/kg	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	460	ug/kg	1	EPA 8270C
218019	Chrysene	4600	4600	ug/kg	10	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	460	ug/kg	1	EPA 8270C
132649	Dibenzofuran	480	460	ug/kg	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	460	ug/kg	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	460	ug/kg	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	460	ug/kg	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	460	ug/kg	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	2400	ug/kg	1	EPA 8270C
84662	Diethylphthalate	BDL	460	ug/kg	1	EPA 8270C
131113	Dimethylphthalate	BDL	460	ug/kg	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	460	ug/kg	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	460	ug/kg	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	460	ug/kg	1	EPA 8270C
206440	Fluoranthene	17000	4600	ug/kg	10	EPA 8270C
86737	Fluorene	1400	460	ug/kg	1	EPA 8270C
118741	Hexachlorobenzene	BDL	460	ug/kg	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	460	ug/kg	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	460	ug/kg	1	EPA 8270C
67721	Hexachloroethane	BDL	460	ug/kg	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	1300	460	ug/kg	1	EPA 8270C
78591	Isophorone	BDL	460	ug/kg	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	460	ug/kg	1	EPA 8270C
91203	Naphthalene	830	460	ug/kg	1	EPA 8270C
88744	2-Nitroaniline	BDL	460	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Report No.: **109428-10** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0040, 06/21/99, 16:10, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
99092	3-Nitroaniline	BDL	460	ug/kg	1	EPA 8270C
100016	4-Nitroaniline	BDL	460	ug/kg	1	EPA 8270C
98953	Nitrobenzene	BDL	460	ug/kg	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	460	ug/kg	1	EPA 8270C
621647	N-Nitroso-di-n-propylamine	BDL	460	ug/kg	1	EPA 8270C
85018	Phenanthrene	11000	4600	ug/kg	10	EPA 8270C
129000	Pyrene	9300	4600	ug/kg	10	EPA 8270C
110861	Pyridine	BDL	460	ug/kg	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	460	ug/kg	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit
Results reported on a dry weight basis

ASI

ANALYTICAL SERVICES, INC.

Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-11**

August 5, 1999

Sample Description

Sloss Industries
Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0044, 06/21/99, 16:45, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	General Chemistry					
57125	Total Cyanide	1.2	0.24	mg/kg	1	EPA 9014
	Moisture	18	0.04	%	1	
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	6.1	mg/kg	1	EPA 6010A
7440382	Total Arsenic	4.9	1.1	mg/kg	1	EPA 7060A
7440393	Total Barium	37	1.2	mg/kg	1	EPA 6010A
7440417	Total Beryllium	BDL	0.61	mg/kg	1	EPA 6010A
7440439	Total Cadmium	5.3	0.61	mg/kg	1	EPA 6010A
7440473	Total Chromium	21	1.2	mg/kg	1	EPA 6010A
7440508	Total Copper	12	2.4	mg/kg	1	EPA 6010A
7439921	Total Lead	36	3.0	mg/kg	1	EPA 6010A
7439976	Total Mercury	BDL	0.30	mg/kg	1	EPA 7471
7440020	Total Nickel	7.7	2.4	mg/kg	1	EPA 6010A
7782492	Total Selenium	BDL	1.1	mg/kg	1	EPA 7740
7440224	Total Silver	BDL	1.2	mg/kg	1	EPA 6010A
7440280	Total Thallium	BDL	0.22	mg/kg	1	EPA 7841
7440666	Total Zinc	230	2.4	mg/kg	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	3000	ug/kg	50	EPA 8260B
107028	Acrolein	BDL	3000	ug/kg	50	EPA 8260B
107131	Acrylonitrile	BDL	1000	ug/kg	50	EPA 8260B
71432	Benzene	BDL	300	ug/kg	50	EPA 8260B
75274	Bromodichloromethane	BDL	300	ug/kg	50	EPA 8260B
75252	Bromoform	BDL	300	ug/kg	50	EPA 8260B
74839	Bromomethane	BDL	610	ug/kg	50	EPA 8260B
75150	Carbon disulfide	BDL	300	ug/kg	50	EPA 8260B
56235	Carbon tetrachloride	BDL	300	ug/kg	50	EPA 8260B
108907	Chlorobenzene	BDL	300	ug/kg	50	EPA 8260B
75003	Chloroethane	BDL	300	ug/kg	50	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	610	ug/kg	50	EPA 8260B
67663	Chloroform	BDL	300	ug/kg	50	EPA 8260B

BDL - Below Detection Limit
Results reported on a dry weight basis

Report No.: **109428-11** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0044, 06/21/99, 16:45, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
74873	Chloromethane	BDL	610	ug/kg	50	EPA 8260B
124481	Dibromochloromethane	BDL	300	ug/kg	50	EPA 8260B
106934	1,2-Dibromoethane	BDL	120	ug/kg	50	EPA 8260B
74953	Dibromomethane	BDL	120	ug/kg	50	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	610	ug/kg	50	EPA 8260B
75718	Dichlorodifluoromethane	BDL	300	ug/kg	50	EPA 8260B
75343	1,1-Dichloroethane	BDL	300	ug/kg	50	EPA 8260B
107062	1,2-Dichloroethane	BDL	300	ug/kg	50	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	300	ug/kg	50	EPA 8260B
75354	1,1-Dichloroethene	BDL	300	ug/kg	50	EPA 8260B
75092	Methylene chloride	BDL	300	ug/kg	50	EPA 8260B
78875	1,2-Dichloropropane	BDL	300	ug/kg	50	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	300	ug/kg	50	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	300	ug/kg	50	EPA 8260B
100414	Ethylbenzene	BDL	300	ug/kg	50	EPA 8260B
97632	Ethyl methacrylate	BDL	300	ug/kg	50	EPA 8260B
591786	2-Hexanone	BDL	3000	ug/kg	50	EPA 8260B
74884	Iodomethane	BDL	300	ug/kg	50	EPA 8260B
78933	2-Butanone	BDL	3000	ug/kg	50	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	3000	ug/kg	50	EPA 8260B
100425	Styrene	BDL	300	ug/kg	50	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	300	ug/kg	50	EPA 8260B
127184	Tetrachloroethene	BDL	300	ug/kg	50	EPA 8260B
108883	Toluene	BDL	120	ug/kg	50	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	120	ug/kg	50	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	120	ug/kg	50	EPA 8260B
79016	Trichloroethene	BDL	120	ug/kg	50	EPA 8260B
75694	Trichlorofluoromethane	BDL	300	ug/kg	50	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	120	ug/kg	50	EPA 8260B
108054	Vinyl acetate	BDL	610	ug/kg	50	EPA 8260B
75014	Vinyl chloride	BDL	61	ug/kg	50	EPA 8260B
1330207	Xylenes	BDL	300	ug/kg	50	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	400	ug/kg	1	EPA 8270C
95578	2-Chlorophenol	BDL	400	ug/kg	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	400	ug/kg	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	400	ug/kg	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	400	ug/kg	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	2100	ug/kg	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	2100	ug/kg	1	EPA 8270C
95487	2-Methylphenol	BDL	400	ug/kg	1	EPA 8270C
108394	3-Methylphenol	BDL	400	ug/kg	1	EPA 8270C
106445	4-Methylphenol	BDL	400	ug/kg	1	EPA 8270C
88755	2-Nitrophenol	BDL	400	ug/kg	1	EPA 8270C
100027	4-Nitrophenol	BDL	2100	ug/kg	1	EPA 8270C
87865	Pentachlorophenol	BDL	400	ug/kg	1	EPA 8270C

BDL - Below Detection Limit
Results reported on a dry weight basis

Report No.: **109428-11** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0044, 06/21/99, 16:45, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108952	Phenol	BDL	400	ug/kg	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	400	ug/kg	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	400	ug/kg	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	400	ug/kg	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	BDL	400	ug/kg	1	EPA 8270C
208968	Acenaphthylene	BDL	400	ug/kg	1	EPA 8270C
120127	Anthracene	BDL	400	ug/kg	1	EPA 8270C
56553	Benzo(a)anthracene	BDL	400	ug/kg	1	EPA 8270C
205992	Benzo(b)fluoranthene	BDL	400	ug/kg	1	EPA 8270C
207089	Benzo(k)fluoranthene	BDL	400	ug/kg	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	400	ug/kg	1	EPA 8270C
50328	Benzo(a)pyrene	BDL	400	ug/kg	1	EPA 8270C
100516	Benzyl Alcohol	BDL	400	ug/kg	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	400	ug/kg	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	400	ug/kg	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	400	ug/kg	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	BDL	400	ug/kg	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	400	ug/kg	1	EPA 8270C
106478	p-Chloroaniline	BDL	400	ug/kg	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	400	ug/kg	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	400	ug/kg	1	EPA 8270C
218019	Chrysene	BDL	400	ug/kg	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	400	ug/kg	1	EPA 8270C
132649	Dibenzofuran	BDL	400	ug/kg	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	400	ug/kg	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	400	ug/kg	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	400	ug/kg	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	400	ug/kg	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	2100	ug/kg	1	EPA 8270C
84662	Diethylphthalate	BDL	400	ug/kg	1	EPA 8270C
131113	Dimethylphthalate	BDL	400	ug/kg	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	400	ug/kg	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	400	ug/kg	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	400	ug/kg	1	EPA 8270C
206440	Fluoranthene	440	400	ug/kg	1	EPA 8270C
86737	Fluorene	BDL	400	ug/kg	1	EPA 8270C
118741	Hexachlorobenzene	BDL	400	ug/kg	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	400	ug/kg	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	400	ug/kg	1	EPA 8270C
67721	Hexachloroethane	BDL	400	ug/kg	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	400	ug/kg	1	EPA 8270C
78591	Isophorone	BDL	400	ug/kg	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	400	ug/kg	1	EPA 8270C
91203	Naphthalene	BDL	400	ug/kg	1	EPA 8270C
88744	2-Nitroaniline	BDL	400	ug/kg	1	EPA 8270C

BDL - Below Detection Limit
Results reported on a dry weight basis

Report No.: **109428-11** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0044, 06/21/99, 16:45, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
99092	3-Nitroaniline	BDL	400	ug/kg	1	EPA 8270C
100016	4-Nitroaniline	BDL	400	ug/kg	1	EPA 8270C
98953	Nitrobenzene	BDL	400	ug/kg	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	400	ug/kg	1	EPA 8270C
621647	N-Nitroso-di-n-propylamine	BDL	400	ug/kg	1	EPA 8270C
85018	Phenanthrene	BDL	400	ug/kg	1	EPA 8270C
129000	Pyrene	BDL	400	ug/kg	1	EPA 8270C
110861	Pyridine	BDL	400	ug/kg	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	400	ug/kg	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

Results reported on a dry weight basis

ASI
ANALYTICAL SERVICES, INC.
Environmental Monitoring & Laboratory Analysis
110 Technology Parkway Norcross, GA 30092
(770) 734-4200 FAX (770) 734-4201

Laboratory Report

Sloss Industries
3500 35th Avenue N
Birmingham, AL 35207

Attention: Mr. Mike P. Griffin
Report No.: **109428-12**

August 5, 1999

Sample Description

Sloss Industries
Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0000, 06/21/99, 17:30, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
	General Chemistry					
57125	Total Cyanide	1.9	0.32	mg/kg	1	EPA 9014
	Moisture	38	0.04	%	1	
	Priority Pollutant Metals					
	Metals					
7440360	Total Antimony	BDL	8.1	mg/kg	1	EPA 6010A
7440382	Total Arsenic	7.0	0.80	mg/kg	1	EPA 7060A
7440393	Total Barium	63	1.6	mg/kg	1	EPA 6010A
7440417	Total Beryllium	BDL	0.81	mg/kg	1	EPA 6010A
7440439	Total Cadmium	2.9	0.81	mg/kg	1	EPA 6010A
7440473	Total Chromium	18	1.6	mg/kg	1	EPA 6010A
7440508	Total Copper	16	3.2	mg/kg	1	EPA 6010A
7439921	Total Lead	18	4.0	mg/kg	1	EPA 6010A
7439976	Total Mercury	BDL	0.40	mg/kg	1	EPA 7471
7440020	Total Nickel	10	3.2	mg/kg	1	EPA 6010A
7782492	Total Selenium	BDL	0.80	mg/kg	1	EPA 7740
7440224	Total Silver	BDL	1.6	mg/kg	1	EPA 6010A
7440280	Total Thallium	BDL	0.16	mg/kg	1	EPA 7841
7440666	Total Zinc	63	3.2	mg/kg	1	EPA 6010A
	Volatile Organics (EPA 8260B)					
67641	Acetone	BDL	4000	ug/kg	50	EPA 8260B
107028	Acrolein	BDL	4000	ug/kg	50	EPA 8260B
107131	Acrylonitrile	BDL	1400	ug/kg	50	EPA 8260B
71432	Benzene	BDL	400	ug/kg	50	EPA 8260B
75274	Bromodichloromethane	BDL	400	ug/kg	50	EPA 8260B
75252	Bromoform	BDL	400	ug/kg	50	EPA 8260B
74839	Bromomethane	BDL	810	ug/kg	50	EPA 8260B
75150	Carbon disulfide	BDL	400	ug/kg	50	EPA 8260B
56235	Carbon tetrachloride	BDL	400	ug/kg	50	EPA 8260B
108907	Chlorobenzene	480	400	ug/kg	50	EPA 8260B
75003	Chloroethane	BDL	400	ug/kg	50	EPA 8260B
110758	2-Chloroethyl vinyl ether	BDL	810	ug/kg	50	EPA 8260B
67663	Chloroform	BDL	400	ug/kg	50	EPA 8260B

BDL - Below Detection Limit
Results reported on a dry weight basis

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0000, 06/21/99, 17:30, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
74873	Chloromethane	BDL	810	ug/kg	50	EPA 8260B
124481	Dibromochloromethane	BDL	400	ug/kg	50	EPA 8260B
106934	1,2-Dibromoethane	BDL	160	ug/kg	50	EPA 8260B
74953	Dibromomethane	BDL	160	ug/kg	50	EPA 8260B
110576	trans-1,4-Dichloro-2-butene	BDL	810	ug/kg	50	EPA 8260B
75718	Dichlorodifluoromethane	BDL	400	ug/kg	50	EPA 8260B
75343	1,1-Dichloroethane	BDL	400	ug/kg	50	EPA 8260B
107062	1,2-Dichloroethane	BDL	400	ug/kg	50	EPA 8260B
156605	trans-1,2-Dichloroethene	BDL	400	ug/kg	50	EPA 8260B
75354	1,1-Dichloroethene	BDL	400	ug/kg	50	EPA 8260B
75092	Methylene chloride	BDL	400	ug/kg	50	EPA 8260B
78875	1,2-Dichloropropane	BDL	400	ug/kg	50	EPA 8260B
10061015	cis-1,3-Dichloropropene	BDL	400	ug/kg	50	EPA 8260B
10061026	trans-1,3-Dichloropropene	BDL	400	ug/kg	50	EPA 8260B
100414	Ethylbenzene	BDL	400	ug/kg	50	EPA 8260B
97632	Ethyl methacrylate	BDL	400	ug/kg	50	EPA 8260B
591786	2-Hexanone	BDL	4000	ug/kg	50	EPA 8260B
74884	Iodomethane	BDL	400	ug/kg	50	EPA 8260B
78933	2-Butanone	BDL	4000	ug/kg	50	EPA 8260B
108101	4-Methyl-2-pentanone	BDL	4000	ug/kg	50	EPA 8260B
100425	Styrene	BDL	400	ug/kg	50	EPA 8260B
79345	1,1,2,2-Tetrachloroethane	BDL	400	ug/kg	50	EPA 8260B
127184	Tetrachloroethene	BDL	400	ug/kg	50	EPA 8260B
108883	Toluene	2800	160	ug/kg	50	EPA 8260B
71556	1,1,1-Trichloroethane	BDL	160	ug/kg	50	EPA 8260B
79005	1,1,2-Trichloroethane	BDL	160	ug/kg	50	EPA 8260B
79016	Trichloroethene	BDL	160	ug/kg	50	EPA 8260B
75694	Trichlorofluoromethane	BDL	400	ug/kg	50	EPA 8260B
96184	1,2,3-Trichloropropane	BDL	160	ug/kg	50	EPA 8260B
108054	Vinyl acetate	BDL	810	ug/kg	50	EPA 8260B
75014	Vinyl chloride	BDL	81	ug/kg	50	EPA 8260B
1330207	Xylenes	BDL	400	ug/kg	50	EPA 8260B
	Acid Extractable Organics (EPA 8270C)					
59507	4-Chloro-3-methylphenol	BDL	530	ug/kg	1	EPA 8270C
95578	2-Chlorophenol	BDL	530	ug/kg	1	EPA 8270C
120832	2,4-Dichlorophenol	BDL	530	ug/kg	1	EPA 8270C
87650	2,6-Dichlorophenol	BDL	530	ug/kg	1	EPA 8270C
105679	2,4-Dimethylphenol	BDL	530	ug/kg	1	EPA 8270C
534521	2-Methyl-4,6-dinitrophenol	BDL	2700	ug/kg	1	EPA 8270C
51285	2,4-Dinitrophenol	BDL	2700	ug/kg	1	EPA 8270C
95487	2-Methylphenol	BDL	530	ug/kg	1	EPA 8270C
108394	3-Methylphenol	BDL	530	ug/kg	1	EPA 8270C
106445	4-Methylphenol	BDL	530	ug/kg	1	EPA 8270C
88755	2-Nitrophenol	BDL	530	ug/kg	1	EPA 8270C
100027	4-Nitrophenol	BDL	2700	ug/kg	1	EPA 8270C
87865	Pentachlorophenol	BDL	530	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0000, 06/21/99, 17:30, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
108952	Phenol	BDL	530	ug/kg	1	EPA 8270C
95954	2,4,5-Trichlorophenol	BDL	530	ug/kg	1	EPA 8270C
88062	2,4,6-Trichlorophenol	BDL	530	ug/kg	1	EPA 8270C
58902	2,3,4,6-Tetrachlorophenol	BDL	530	ug/kg	1	EPA 8270C
	Base/Neutral Extractable Organics (EPA 8270C)					
83329	Acenaphthene	680	530	ug/kg	1	EPA 8270C
208968	Acenaphthylene	BDL	530	ug/kg	1	EPA 8270C
120127	Anthracene	840	530	ug/kg	1	EPA 8270C
56553	Benzo(a)anthracene	1800	530	ug/kg	1	EPA 8270C
205992	Benzo(b)fluoranthene	2700	530	ug/kg	1	EPA 8270C
207089	Benzo(k)fluoranthene	3100	530	ug/kg	1	EPA 8270C
191242	Benzo(g,h,i)perylene	BDL	530	ug/kg	1	EPA 8270C
50328	Benzo(a)pyrene	2200	530	ug/kg	1	EPA 8270C
100516	Benzyl Alcohol	BDL	530	ug/kg	1	EPA 8270C
111911	Bis(2-chloroethoxy)methane	BDL	530	ug/kg	1	EPA 8270C
111444	Bis(2-chloroethyl)ether	BDL	530	ug/kg	1	EPA 8270C
39638329	Bis(2-chloroisopropyl)ether	BDL	530	ug/kg	1	EPA 8270C
117817	Bis(2-ethylhexyl)phthalate	4200	530	ug/kg	1	EPA 8270C
101553	4-Bromophenyl phenyl ether	BDL	530	ug/kg	1	EPA 8270C
106478	p-Chloroaniline	BDL	530	ug/kg	1	EPA 8270C
91587	2-Chloronaphthalene	BDL	530	ug/kg	1	EPA 8270C
7005723	4-Chlorophenyl phenyl ether	BDL	530	ug/kg	1	EPA 8270C
218019	Chrysene	2100	530	ug/kg	1	EPA 8270C
53703	Dibenz(a,h)anthracene	BDL	530	ug/kg	1	EPA 8270C
132649	Dibenzofuran	BDL	530	ug/kg	1	EPA 8270C
84742	Di-n-butylphthalate	BDL	530	ug/kg	1	EPA 8270C
541731	1,3-Dichlorobenzene	BDL	530	ug/kg	1	EPA 8270C
106467	1,4-Dichlorobenzene	BDL	530	ug/kg	1	EPA 8270C
95501	1,2-Dichlorobenzene	BDL	530	ug/kg	1	EPA 8270C
119937	3,3'-Dimethylbenzidine	BDL	2700	ug/kg	1	EPA 8270C
84662	Diethylphthalate	BDL	530	ug/kg	1	EPA 8270C
131113	Dimethylphthalate	BDL	530	ug/kg	1	EPA 8270C
121142	2,4-Dinitrotoluene	BDL	530	ug/kg	1	EPA 8270C
606202	2,6-Dinitrotoluene	BDL	530	ug/kg	1	EPA 8270C
117840	Di-n-octylphthalate	BDL	530	ug/kg	1	EPA 8270C
206440	Fluoranthene	7800	5300	ug/kg	10	EPA 8270C
86737	Fluorene	880	530	ug/kg	1	EPA 8270C
118741	Hexachlorobenzene	BDL	530	ug/kg	1	EPA 8270C
87683	Hexachlorobutadiene	BDL	530	ug/kg	1	EPA 8270C
77474	Hexachlorocyclopentadiene	BDL	530	ug/kg	1	EPA 8270C
67721	Hexachloroethane	BDL	530	ug/kg	1	EPA 8270C
193395	Indeno(1,2,3-cd)pyrene	BDL	530	ug/kg	1	EPA 8270C
78591	Isophorone	BDL	530	ug/kg	1	EPA 8270C
91576	2-Methylnaphthalene	BDL	530	ug/kg	1	EPA 8270C
91203	Naphthalene	1400	530	ug/kg	1	EPA 8270C
88744	2-Nitroaniline	BDL	530	ug/kg	1	EPA 8270C

BDL - Below Detection Limit

Results reported on a dry weight basis

Report No.: **109428-12** August 5, 1999

Sample Description

Sloss Industries

Soil, Birmingham, Project #TF00320.0016, 990621-BT-IW-SL0000, 06/21/99, 17:30, received 06/22/99

CAS #	Analyte	Result	Detection Limit	Units	Dilution Factor	Analytical Method
99092	3-Nitroaniline	BDL	530	ug/kg	1	EPA 8270C
100016	4-Nitroaniline	BDL	530	ug/kg	1	EPA 8270C
98953	Nitrobenzene	BDL	530	ug/kg	1	EPA 8270C
62759	N-Nitrosodimethylamine	BDL	530	ug/kg	1	EPA 8270C
621647	N-Nitroso-di-n-propylamine	BDL	530	ug/kg	1	EPA 8270C
85018	Phenanthrene	5000	530	ug/kg	1	EPA 8270C
129000	Pyrene	3500	530	ug/kg	1	EPA 8270C
110861	Pyridine	BDL	530	ug/kg	1	EPA 8270C
120821	1,2,4-Trichlorobenzene	BDL	530	ug/kg	1	EPA 8270C

Respectfully submitted,

Project Manager

Quality Assurance

BDL - Below Detection Limit

Results reported on a dry weight basis

Analytical Services Inc. Batch QC
For Report Number :109428
Base Neutrals / Acids

Matrix : Soil/Sediment Batch # 49259 Method : EPA 8270

Lab Control Information Analyte	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
Phenol	73	72	2	41 - 89	0 - 36
2-Chlorophenol	73	71	2	42 - 87	0 - 41
1,4-Dichlorobenzene	73	69	5	44 - 74	0 - 47
N-Nitrosodipropylamine	79	80	2	49 - 75	0 - 36
1,2,4-Trichlorobenzene	87	82	6	48 - 80	0 - 46
4-Chloro-3-methylphenol	86	86	1	43 - 95	0 - 42
Acenaphthene	87	86	1	56 - 96	0 - 32
2,4-Dinitrotoluene	84	89	6	59 - 120	0 - 42
4-Nitrophenol	91	96	5	39 - 85	0 - 49
Pentachlorophenol	107	112	4	41 - 109	0 - 50
Pyrene	94	101	7	61 - 119	0 - 40

Matrix Spike Information Analyte	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
henol	75	41	59	41 - 89	0 - 36
2-Chlorophenol	61	67	10	42 - 87	0 - 41
1,4-Dichlorobenzene	54	59	9	44 - 74	0 - 47
N-Nitrosodipropylamine	65	72	10	49 - 75	0 - 36
1,2,4-Trichlorobenzene	67	73	8	48 - 80	0 - 46
4-Chloro-3-methylphenol	75	79	5	43 - 95	0 - 42
Acenaphthene	72	78	9	56 - 96	0 - 32
2,4-Dinitrotoluene	78	78	1	59 - 120	0 - 42
4-Nitrophenol	85	89	5	39 - 85	0 - 49
Pentachlorophenol	109	105	4	41 - 109	0 - 50
Pyrene	88	94	6	61 - 119	0 - 40

Analytical Services Inc. Batch QC
Surrogate Recovery
Base Neutrals / Acids

Matrix : Soil/Sediment Batch # 49259 Method : EPA 8270

% Recovery Objectives

S1	2-Fluorophenol	25 - 121
S2	Phenol-d5	24 - 113
S3	Nitrobenzene-d5	23 - 120
S4	2-Fluorobiphenyl	30 - 115
S5	2,4,6-Tribromophenol	19 - 122
S6	Terphenyl-d14	18 - 137

Sample	File	S1	S2	S3	S4	S5	S6
49259BLK	B3081	71	69	69	80	82	87
49259LCS	B3082	79	76	77	86	97	88
49259LCSD	B3083	75	74	77	84	98	96
108995-2MS	B3085	60	58	63	66	87	82
^^Note: AKA 108995-1							
108995-5MSD	B3086	65	63	69	72	85	86
^^Note: AKA 108995-1							
108941-1	B3094	60	60	59	64	71	75
108941-2	B3095	71	69	69	72	85	84
108995-1	B3087	59	57	60	65	76	76
108995-3	B3088	50	48	51	54	66	69
108995-4	B3089	50	49	51	54	78	78
108995-4DUP	B3090	60	58	62	66	79	79
108995-6	B3091	65	60	64	66	78	72
108995-7	B3092	59	60	51	63	75	75
108995-13	B3093	56	56	52	55	75	68
108995-2MS D	B3127	48	57	56	64	67	83
^^Note: 1:10 DILUTION							
108995-5MSD D	B3128	47	55	53	63	51	79
^^Note: 1:10 DILUTION							
108995-1D	B3163	27	35	33	51	0	58
^^Note: 1:10 DILUTION							
108995-3D	B3164	21	24	10	43	0	59
^^Note: 1:10 DILUTION							
108995-4D	B3165	20	24	9	42	0	67
^^Note: 1:10 DILUTION							
108995-8	B3139	62	69	81	73	100	82
108995-8D	B3131	49	51	68	75	75	75
^^Note: 1:10 DILUTION							

Analytical Services Inc. Batch QC
Surrogate Recovery
Base Neutrals / Acids

Matrix : Soil/Sediment Batch # 49259 Method : EPA 8270

% Recovery Objectives

S1	2-Fluorophenol	25 - 121
S2	Phenol-d5	24 - 113
S3	Nitrobenzene-d5	23 - 120
S4	2-Fluorobiphenyl	30 - 115
S5	2,4,6-Tribromophenol	19 - 122
S6	Terphenyl-d14	18 - 137

Sample	File	S1	S2	S3	S4	S5	S6
108995-9	B3132	61	60	66	65	83	62
108995-10	B3133	55	59	60	62	90	73
108995-11	B3137	68	70	70	72	96	89
108995-12	B3138	58	61	60	60	100	90
108995-4DUP D	B3230	44	56	56	53	33	72
^^Note: 1:10 DILUTION							
108995-6D	B3231	59	64	61	56	30	78
^^Note: 1:10 DILUTION							
109428-5	B3378	55	61	75	72	70	49
109428-6	B3377	70	76	88	80	105	80
109428-7	B3379	63	78	30	45	47	71
109428-8	B3380	57	68	91	70	71	91
109428-10	B3381	54	56	74	57	78	70
109428-12	B3382	11	40	78	62	4	64
^^Note: Matrix interference							
109428-9	A8080	61	64	57	72	78	73
109428-11	A8081	55	58	52	63	74	75
109428-7D	A8090	66	78	72	100	97	90
^^Note: 1:10 DILUTION							
109428-10D	A8088	59	69	62	88	90	96
^^Note: 1:10 DILUTION							
108428-12D	A8089	7	46	65	90	1	77
^^Note: 1:10 DILUTION ;MATRIX EFFECT							
DAYBL06/24	A8100	51	52	46	63	46	73

Q.C. Information for Batch # 49259   Printed: 08/05/99 08:15:21

Blank Results Information
Base Neutrals / Acids   Method : EPA 8270

Analyte	Blank Result	Detection Limit
4-Chloro-3-methylphenol	BDL	330
2-Chlorophenol	BDL	330
2,4-Dichlorophenol	BDL	330
2,6-Dichlorophenol	BDL	330
2,4-Dimethylphenol	BDL	330
2-Methyl-4,6-dinitrophenol	BDL	1700
2,4-Dinitrophenol	BDL	1700
2-Methylphenol	BDL	330
3-Methylphenol	BDL	330
4-Methylphenol	BDL	330
2-Nitrophenol	BDL	330
4-Nitrophenol	BDL	1700
Pentachlorophenol	BDL	330
Phenol	BDL	330
2,4,5-Trichlorophenol	BDL	330
2,4,6-Trichlorophenol	BDL	330
2,3,4,6-Tetrachlorophenol	BDL	330
Acenaphthene	BDL	330
Acenaphthylene	BDL	330
Anthracene	BDL	330
Benzo(a)anthracene	BDL	330
Benzo(b)fluoranthene	BDL	330
Benzo(k)fluoranthene	BDL	330
Benzo(g,h,i)perylene	BDL	330
Benzo(a)pyrene	BDL	330
Benzyl Alcohol	BDL	330
Bis(2-chloroethoxy)methane	BDL	330
Bis(2-chloroethyl)ether	BDL	330
Bis(2-chloroisopropyl)ether	BDL	330
Bis(2-ethylhexyl)phthalate	BDL	330
4-Bromophenyl phenyl ether	BDL	330
p-Chloroaniline	BDL	330
2-Chloronaphthalene	BDL	330
4-Chlorophenyl phenyl ether	BDL	330
Chrysene	BDL	330
Dibenz(a,h)anthracene	BDL	330
Dibenzofuran	BDL	330
Di-n-butylphthalate	BDL	330
1,3-Dichlorobenzene	BDL	330
1,4-Dichlorobenzene	BDL	330
1,2-Dichlorobenzene	BDL	330
3,3'-Dimethylbenzidine	BDL	1700
Diethylphthalate	BDL	330
Dimethylphthalate	BDL	330
2,4-Dinitrotoluene	BDL	330
2,6-Dinitrotoluene	BDL	330
Di-n-octylphthalate	BDL	330
Fluoranthene	BDL	330
Fluorene	BDL	330

Q.C. Information for Batch # 49259 Printed: 08/05/99 08:15:21

Blank Results Information
Base Neutrals / Acids Method : EPA 8270

Analyte	Blank Result	Detection Limit
Hexachlorobenzene	BDL	330
Hexachlorobutadiene	BDL	330
Hexachlorocyclopentadiene	BDL	330
Hexachloroethane	BDL	330
Indeno(1,2,3-cd)pyrene	BDL	330
Isophorone	BDL	330
2-Methylnaphthalene	BDL	330
Naphthalene	BDL	330
2-Nitroaniline	BDL	330
3-Nitroaniline	BDL	330
4-Nitroaniline	BDL	330
Nitrobenzene	BDL	330
N-Nitrosodimethylamine	BDL	330
N-Nitroso-di-n-propylamine	BDL	330
Phenanthrene	BDL	330
Pyrene	BDL	330
Pyridine	BDL	330
1,2,4-Trichlorobenzene	BDL	330

Sample Batch Information
Base Neutrals / Acids Method : EPA 8270

Sample ID	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
49259BLK	06/14/99	1400	DG/MC		06/15/99	1746	RAC	5971
49259LCS	06/14/99	1400	DG/MC		06/15/99	1817	RAC	5971
49259LCSD	06/14/99	1400	DG/MC		06/15/99	1849	RAC	5971
108995-2MS	06/14/99	1400	DG/MC		06/15/99	1952	RAC	5971
108995-5MSD	06/14/99	1400	DG/MC		06/15/99	2023	RAC	5971
108995-4DUP	06/14/99	1400	DG/MC		06/15/99	2229	RAC	5971
108995-1	06/14/99	1400	DG/MC		06/15/99	2055	RAC	5971
108995-3	06/14/99	1400	DG/MC		06/15/99	2126	RAC	5971
108995-4	06/14/99	1400	DG/MC		06/15/99	2158	RAC	5971
108995-6	06/14/99	1400	DG/MC		06/15/99	2300	RAC	5971
108995-7	06/14/99	1400	DG/MC		06/15/99	2332	RAC	5971
108995-8	06/14/99	1400	DG/MC		06/17/99	0311	TAS	5971
108995-9	06/14/99	1400	DG/MC		06/16/99	2337	TAS	5971
108995-10	06/14/99	1400	DG/MC		06/17/99	0008	TAS	5971
108995-11	06/14/99	1400	DG/MC		06/17/99	0210	TAS	5971
108995-12	06/14/99	1400	DG/MC		06/17/99	0240	TAS	5971
108995-13	06/14/99	1400	DG/MC		06/16/99	1203	RAC	5971
108941-1	06/14/99	1400	DG/MC		06/16/99	1235	RAC	5971
108941-2	06/14/99	1400	DG/MC		06/16/99	0106	RAC	5971
108995-2MS D	/ /				06/16/99	2104	RAC	5971
108995-5MSD D	/ /				06/16/99	2135	RAC	5971
108995-1D	/ /				06/17/99	2059	TAS	5971
108995-3D	/ /				06/17/99	2129	TAS	5971
108995-4D	/ /				06/17/99	2200	TAS	5971
108995-8D	/ /				06/16/99	2306	TAS	5971
108995-4DUP D	/ /				06/21/99	0923	TAS	5971
108995-6D	/ /				06/21/99	0956	TAS	5971
DAYBL06/24	06/24/99	1130	DG		06/29/99	2015	RAC	5973
109428-5	06/24/99	1130	DG		06/27/99	1906	RAC	5971
109428-6	06/24/99	1130	DG		06/27/99	1834	RAC	5971
109428-7	06/24/99	1130	DG		06/27/99	1937	RAC	5971
109428-8	06/24/99	1130	DG		06/27/99	2008	RAC	5971
109428-9	06/24/99	1130	DG		06/28/99	2056	RAC	5973
109428-10	06/24/99	1130	DG		06/27/99	2040	RAC	5971
109428-11	06/24/99	1130	DG		06/28/99	2130	RAC	5973
109428-12	06/24/99	1130	DG		06/27/99	2111	RAC	5971
109428-7D	/ /				06/29/99	0237	RAC	5973
109428-10D	/ /				06/29/99	0129	RAC	5973
108428-12D	/ /				06/29/99	0203	RAC	5973

Analytical Services Inc. Batch QC
For Report Number :109428
Base Neutrals / Acids

Matrix : Aqueous Batch # 49282 Method : EPA 8270

Lab Control Information Analyte	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
Phenol	29	27	5	12 - 89	0 - 42
2-Chlorophenol	67	56	17	27 - 123	0 - 40
1,4-Dichlorobenzene	51	39	27	36 - 97	0 - 28
N-Nitrosodipropylamine	88	71	21	41 - 116	0 - 38
1,2,4-Trichlorobenzene	64	49	27	44 - 142	0 - 28
4-Chloro-3-methylphenol	87	78	11	23 - 97	0 - 42
Acenaphthene	84	67	23	46 - 118	0 - 31
2,4-Dinitrotoluene	80	74	7	24 - 96	0 - 38
4-Nitrophenol	25	24	2	10 - 80	0 - 50
Pentachlorophenol	95	83	14	9 - 103	0 - 50
Pyrene	103	93	10	26 - 127	0 - 31

Matrix Spike Information Analyte	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
Phenol	51	29	54	15 - 64	0 - 32
2-Chlorophenol	75	54	32	36 - 87	0 - 35
1,4-Dichlorobenzene	59	47	23	31 - 83	0 - 31
N-Nitrosodipropylamine	92	78	17	42 - 108	0 - 33
1,2,4-Trichlorobenzene	72	63	13	35 - 96	0 - 33
4-Chloro-3-methylphenol	92	76	19	35 - 99	0 - 26
Acenaphthene	91	77	17	47 - 113	0 - 28
2,4-Dinitrotoluene	85	77	9	34 - 109	0 - 30
4-Nitrophenol	54	37	37	6 - 69	0 - 44
Pentachlorophenol	100	105	5	12 - 106	0 - 44
Pyrene	107	103	4	55 - 133	0 - 28

Analytical Services Inc. Batch QC
Surrogate Recovery
Base Neutrals / Acids

Matrix : Aqueous   Batch # 49282   Method : EPA 8270

% Recovery Objectives

S1	2-Fluorophenol	21 - 100
S2	Phenol-d5	10 - 94
S3	Nitrobenzene-d5	35 - 114
S4	2-Fluorobiphenyl	43 - 116
S5	2,4,6-Tribromophenol	10 - 123
S6	Terphenyl-d14	33 - 141

Sample	File	S1	S2	S3	S4	S5	S6
49282BLK	B3118	30	19	62	62	83	86
49282LCS	B3119	37	27	78	81	106	97
49282LCSD	B3120	39	26	63	62	96	87
109119-10MS	B3121	64	50	85	88	111	98
109119-10MSD	B3122	38	28	72	74	98	93
109119-10	B3123	40	28	76	80	101	98
109119-11	B3124	41	25	75	73	88	95
108995-14	B3125	31	21	60	59	73	80
108995-15	B3126	32	24	71	71	84	87
109373-3DUP	B3347	30	22	68	72	121	72
109373-4	B3351	32	23	74	67	91	67
109373-3	B3350	36	25	79	88	119	74
109373-5	B3352	30	23	73	65	91	73
109373-6	B3353	30	22	73	61	88	78
109373-7	B3354	38	25	81	72	96	91
109373-8	B3355	33	23	73	66	83	99
109428-1	B3356	28	19	57	54	93	90
109428-2	B3357	30	20	52	53	101	74
109428-3	B3358	39	24	76	67	111	70
109390-1	B3346	38	24	71	68	111	79
109428-2D	A8085	27	21	50	74	81	91
^^Note: 1:10 DILUTION							
109373-1	B3348	29	22	68	61	88	62
109373-2	B3349	34	23	76	74	113	79
DAYBL06/23	A8099	50	33	78	86	78	76
DAYBL06/14	B3053	66	50	81	82	89	94
DAYBL06/01	A7770	35	26	70	67	66	89
DAYBL06/22	A8076	38	25	70	73	77	82
109373-5MS	A8209	34	25	64	69	72	59
109373-6MSD	A8210	28	23	56	68	82	69
109373-5MSRR	A8219	35	26	67	76	80	77

Q.C. Information for Batch # 49282 Printed: 08/05/99 08:15:23

Blank Results Information
Base Neutrals / Acids Method : EPA 8270

Analyte	Blank Result	Detection Limit
4-Chloro-3-methylphenol	BDL	10
2-Chlorophenol	BDL	10
2,4-Dichlorophenol	BDL	10
2,6-Dichlorophenol	BDL	10
2,4-Dimethylphenol	BDL	10
2-Methyl-4,6-dinitrophenol	BDL	50
2,4-Dinitrophenol	BDL	50
2-Methylphenol	BDL	10
3-Methylphenol	BDL	10
4-Methylphenol	BDL	10
2-Nitrophenol	BDL	10
4-Nitrophenol	BDL	50
Pentachlorophenol	BDL	10
Phenol	BDL	10
2,4,5-Trichlorophenol	BDL	10
2,4,6-Trichlorophenol	BDL	10
2,3,4,6-Tetrachlorophenol	BDL	10
Acenaphthene	BDL	10
Acenaphthylene	BDL	10
Anthracene	BDL	10
Benzo(a)anthracene	BDL	10
Benzo(b)fluoranthene	BDL	10
Benzo(k)fluoranthene	BDL	10
Benzo(g,h,i)perylene	BDL	10
Benzo(a)pyrene	BDL	10
Benzyl Alcohol	BDL	10
Bis(2-chloroethoxy)methane	BDL	10
Bis(2-chloroethyl)ether	BDL	10
Bis(2-chloroisopropyl)ether	BDL	10
Bis(2-ethylhexyl)phthalate	BDL	10
4-Bromophenyl phenyl ether	BDL	10
p-Chloroaniline	BDL	10
2-Chloronaphthalene	BDL	10
4-Chlorophenyl phenyl ether	BDL	10
Chrysene	BDL	10
Dibenz(a,h)anthracene	BDL	10
Dibenzofuran	BDL	10
Di-n-butylphthalate	BDL	10
1,3-Dichlorobenzene	BDL	10
1,4-Dichlorobenzene	BDL	10
1,2-Dichlorobenzene	BDL	10
3,3'-Dimethylbenzidine	BDL	100
Diethylphthalate	BDL	10
Dimethylphthalate	BDL	10
2,4-Dinitrotoluene	BDL	10
2,6-Dinitrotoluene	BDL	10
Di-n-octylphthalate	BDL	10
Fluoranthene	BDL	10
Fluorene	BDL	10

Q.C. Information for Batch # 49282   Printed: 08/05/99 08:15:23

Blank Results Information
Base Neutrals / Acids   Method : EPA 8270

Analyte	Blank Result	Detection Limit
Hexachlorobenzene	BDL	10
Hexachlorobutadiene	BDL	10
Hexachlorocyclopentadiene	BDL	10
Hexachloroethane	BDL	2
Indeno(1,2,3-cd)pyrene	BDL	10
Isophorone	BDL	10
2-Methylnaphthalene	BDL	10
Naphthalene	BDL	10
2-Nitroaniline	BDL	10
3-Nitroaniline	BDL	10
4-Nitroaniline	BDL	10
Nitrobenzene	BDL	10
N-Nitrosodimethylamine	BDL	10
N-Nitrosodi-n-propylamine	BDL	10
Phenanthrene	BDL	10
Pyrene	BDL	10
Pyridine	BDL	10
1,2,4-Trichlorobenzene	BDL	10

Q.C. Information for Batch # 49282 Printed: 08/05/99 08:15:23

Sample Batch Information
Base Neutrals / Acids Method : EPA 8270

Sample ID	Preparation Date	Time	By	Preparation Notes	Analysis Date	Time	By	Inst
49282BLK	06/15/99	1100	SVOA		06/16/99	1627	RAC	5971
49282LCS	06/15/99	1100	SVOA		06/16/99	1658	RAC	5971
49282LCSD	06/15/99	1100	SVOA		06/16/99	1729	RAC	5971
109119-10	06/15/99	1100	SVOA		06/16/99	1901	RAC	5971
109119-10MS	06/15/99	1100	SVOA	QC	06/16/99	1800	RAC	5971
109119-10MSD	06/15/99	1100	SVOA	QC	06/16/99	1831	RAC	5971
109119-11	06/15/99	1100	SVOA		06/16/99	1932	RAC	5971
108995-14	06/14/99	1015	SVOA		06/16/99	2003	RAC	5971
108995-15	06/14/99	1015	SVOA		06/16/99	2033	RAC	5971
DAYBL06/14	06/14/99	1015	SVOA		06/14/99	2033	TAS	5971
DAYBL06/22	06/22/99	0900	SVOA		06/28/99	1839	RAC	5973
109390-1	06/22/99	0900	SVOA		06/26/99	0407	RAC	5971
DAYBL06/23	06/23/99	1100	SVOA		06/29/99	1942	RAC	5973
109373-3DUP	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0440	RAC	5971
109373-1	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0513	TAS	5971
109373-2	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0545	TAS	5971
109373-3	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0618	RAC	5971
109373-4	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0651	RAC	5971
109373-5	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0724	RAC	5971
109373-6	06/23/99	1100	SVOA	BAD EMULSIONS	06/26/99	0756	RAC	5971
109373-7	06/23/99	1100	SVOA		06/26/99	0829	RAC	5971
109373-8	06/23/99	1100	SVOA		06/26/99	0902	RAC	5971
109428-1	06/23/99	1100	SVOA		06/26/99	0935	RAC	5971
109428-2	06/23/99	1100	SVOA		06/26/99	1007	RAC	5971
109428-3	06/23/99	1100	SVOA		06/26/99	1040	RAC	5971
109373-11	/ /				06/26/99	0513	RAC	5971
109373-12	/ /				06/26/99	0545	RAC	5971
109428-2D	/ /				06/28/99	2346	RAC	5973
DAYBL06/01	/ /				06/04/99	1146	RAC	5973
DAYBL07/06	07/06/99	1430	SVOA		/ /			
109373-5MS	07/06/99	1430	SVOA		07/08/99	0300	TAS	5973
109373-6MSD	07/06/99	1430	SVOA		07/08/99	0334	TAS	5973
109373-5MSRR	07/07/99	1730	SVOA		07/08/99	0832	TAS	5973

Analytical Services Inc. Batch QC
For Report Number :109428
Volatile Organics

Matrix : Aqueous Batch # 49546 Method : EPA 8260

Lab Control Information Analyte	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
1,1-Dichloroethene	92	86	7	72 - 119	0 - 18
Trichloroethene	106	99	7	76 - 114	0 - 18
Benzene	105	103	2	79 - 113	0 - 16
Toluene	103	98	5	73 - 115	0 - 17
Chlorobenzene	110	107	3	76 - 115	0 - 18

Matrix Spike Information Analyte	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
1,1-Dichloroethene	77	77	0	61 - 122	0 - 25
Trichloroethene	92	91	1	72 - 136	0 - 16
Benzene	90	89	1	83 - 126	0 - 15
Toluene	89	88	1	81 - 121	0 - 17
Chlorobenzene	99	97	2	86 - 125	0 - 14

Analytical Services Inc. Batch QC
Surrogate Recovery
Volatile Organics

Matrix : Aqueous   Batch # 49546   Method : EPA 8260

% Recovery Objectives

S1	Dibromofluoromethane	78 - 128
S2	1,2-Dichloroethane-d4	82 - 129
S3	Toluene-d8	85 - 112
S4	4-Bromofluorobenzene	82 - 113

Sample	File	S1	S2	S3	S4	S5	S6
49546BLK	B4881	103	108	97	99		
49546LCS	B4897	104	111	97	94		
49546LCSD	B4898	106	112	96	96		
109373-8	B4899	105	112	97	93		
109373-9	B4900	105	112	97	91		
DAYBLK 07/01	B4030	107	112	96	99		
109428-1	B5049	109	120	93	94		
109428-2	B5050	108	121	93	98		
109428-3	B5051	110	118	95	92		
109428-4	B5052	108	120	95	92		
109373-8MS	B5053	107	118	93	92		
109373-8MSD	B5054	109	121	94	93		

Q.C. Information for Batch # 49546 Printed: 08/05/99 08:15:24

Blank Results Information
Volatile Organics Method : EPA 8260

Analyte	Blank Result	Detection Limit
Acetone	BDL	50
Acrolein	BDL	50
Acrylonitrile	BDL	50
Benzene	BDL	5
Bromodichloromethane	BDL	5
Bromoform	BDL	5
Bromomethane	BDL	10
Carbon disulfide	BDL	5
Carbon tetrachloride	BDL	5
Chlorobenzene	BDL	5
Chloroethane	BDL	5
2-Chloroethyl vinyl ether	BDL	10
Chloroform	BDL	5
Chloromethane	BDL	10
Dibromochloromethane	BDL	5
1,2-Dibromoethane	BDL	1
Dibromomethane	BDL	2
trans-1,4-Dichloro-2-butene	BDL	10
Dichlorodifluoromethane	BDL	5
1,1-Dichloroethane	BDL	5
1,2-Dichloroethane	BDL	5
trans-1,2-Dichloroethene	BDL	5
1,1-Dichloroethene	BDL	5
Methylene chloride	BDL	5
1,2-Dichloropropane	BDL	5
cis-1,3-Dichloropropene	BDL	5
trans-1,3-Dichloropropene	BDL	5
Ethylbenzene	BDL	5
Ethyl methacrylate	BDL	5
2-Hexanone	BDL	50
Iodomethane	BDL	5
2-Butanone	BDL	50
4-Methyl-2-pentanone	BDL	50
Styrene	BDL	5
1,1,2,2-Tetrachloroethane	BDL	5
Tetrachloroethene	BDL	5
Toluene	BDL	2
1,1,1-Trichloroethane	BDL	2
1,1,2-Trichloroethane	BDL	2
Trichloroethene	BDL	2
Trichlorofluoromethane	BDL	5
1,2,3-Trichloropropane	BDL	2
Vinyl acetate	BDL	10
Vinyl chloride	BDL	1
Xylenes	BDL	5

Q.C. Information for Batch # 49546   Printed: 08/05/99 08:15:24

Sample Batch Information
Volatile Organics   Method : EPA 8260

Sample ID	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
49546BLK	/ /				06/26/99	2127	LLP	VOA2
49546LCS	/ /				06/27/99	0547	LLP	VOA2
49546LCSD	/ /				06/27/99	0619	LLP	VOA2
109373-8	/ /				06/27/99	0650	LLP	VOA2
109373-9	/ /				06/27/99	0721	LLP	VOA2
DAYBLK 07/01	/ /				07/01/99	1005	JTC	VOA2
109428-1	/ /				07/01/99	2140	JTC	VOA2
109428-2	/ /				07/01/99	2211	JTC	VOA2
109428-3	/ /				07/01/99	2243	JTC	VOA2
109428-4	/ /				07/01/99	2314	JTC	VOA2
109373-8MS	/ /				07/01/99	2345	JTC	VOA2
109373-8MSD	/ /				07/01/99	0016	JTC	VOA2

Analytical Services Inc. Batch QC
For Report Number :109428
Volatile Organics

Matrix : Soil/Sediment Batch # 49679 Method : EPA 8260

Lab Control Information Analyte	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
1,1-Dichloroethene	79	88	10	66 - 112	0 - 32
Trichloroethene	83	92	10	86 - 110	0 - 18
Benzene	89	98	10	83 - 112	0 - 17
Toluene	89	96	7	85 - 112	0 - 20
Chlorobenzene	96	104	8	88 - 115	0 - 19

Matrix Spike Information Analyte	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
1,1-Dichloroethene	65	76	16	66 - 122	0 - 34
Trichloroethene	68	87	25	70 - 114	0 - 18
Benzene	77	95	21	74 - 121	0 - 17
Toluene	80	100	22	71 - 122	0 - 21
Chlorobenzene	81	96	17	71 - 129	0 - 19

Analytical Services Inc. Batch QC
Surrogate Recovery
Volatile Organics

Matrix : Soil/Sediment Batch # 49679 Method : EPA 8260

% Recovery Objectives

S1	Dibromofluoromethane	78 - 144
S2	1,2-Dichloroethane-d4	64 - 147
S3	Toluene-d8	64 - 126
S4	4-Bromofluorobenzene	60 - 128

Sample	File	S1	S2	S3	S4	S5	S6
49679BLK	B4999	107	116	95	95		
49679LCS	B5015	103	111	95	95		
49679LCSD	B5016	106	113	94	97		
109428-5	B5017	106	114	96	94		
^^Note: 1:50	DIL						
109428-6	B5018	104	111	97	93		
^^Note: 1:50	DIL						
109428-7	B5019	103	111	97	96		
^^Note: 1:50	DIL						
109428-8	B5020	103	109	98	99		
^^Note: 1:50	DIL						
109428-9	B5021	102	108	98	100		
^^Note: 1:50	DIL						
109428-10	B5022	103	111	99	98		
^^Note: 1:50	DIL						
DAYBLK 07/01	B4030	107	112	96	99		
109428-11	B5023	103	111	99	100		
^^Note: 1:50	DIL						
109428-12	B5024	100	109	97	99		
^^Note: 1:50	DIL						
109428-5MS	B5025	102	109	99	99		
^^Note: 1:50	DIL						
109428-5MSD	B5026	101	106	99	96		
^^Note: 1:50	DIL						
DAYBLK 07/12	B5241	108	128	102	108		
109428-12DUP	B5243	109	131	105	112		
^^Note: 1:50	DIL						

Blank Results Information
Volatile Organics Method : EPA 8260

Analyte	Blank Result	Detection Limit
Acetone	BDL	2500
Acrolein	BDL	2500
Acrylonitrile	BDL	850
Benzene	BDL	250
Bromodichloromethane	BDL	250
Bromoform	BDL	250
Bromomethane	BDL	500
Carbon disulfide	BDL	250
Carbon tetrachloride	BDL	250
Chlorobenzene	BDL	250
Chloroethane	BDL	250
2-Chloroethyl vinyl ether	BDL	500
Chloroform	BDL	250
Chloromethane	BDL	500
Dibromochloromethane	BDL	250
1,2-Dibromoethane	BDL	100
Dibromomethane	BDL	100
trans-1,4-Dichloro-2-butene	BDL	500
Dichlorodifluoromethane	BDL	250
1,1-Dichloroethane	BDL	250
1,2-Dichloroethane	BDL	250
trans-1,2-Dichloroethene	BDL	250
1,1-Dichloroethene	BDL	250
Methylene chloride	BDL	250
1,2-Dichloropropane	BDL	250
cis-1,3-Dichloropropene	BDL	250
trans-1,3-Dichloropropene	BDL	250
Ethylbenzene	BDL	250
Ethyl methacrylate	BDL	250
2-Hexanone	BDL	2500
Iodomethane	BDL	250
2-Butanone	BDL	2500
4-Methyl-2-pentanone	BDL	2500
Styrene	BDL	250
1,1,2,2-Tetrachloroethane	BDL	250
Tetrachloroethene	BDL	250
Toluene	BDL	100
1,1,1-Trichloroethane	BDL	100
1,1,2-Trichloroethane	BDL	100
Trichloroethene	BDL	100
Trichlorofluoromethane	BDL	250
1,2,3-Trichloropropane	BDL	100
Vinyl acetate	BDL	500
Vinyl chloride	BDL	50
Xylenes	BDL	250

Q.C. Information for Batch # 49679 Printed: 08/05/99 08:15:26

Sample Batch Information
Volatile Organics Method : EPA 8260

	Preparation			Preparation	Analysis			
Sample ID	Date	Time	By	Notes	Date	Time	By	Inst
49679BLK	/ /				06/30/99	1149	JTC	VOA2
49679LCS	/ /				06/30/99	1944	JTC	VOA2
49679LCSD	/ /				06/30/99	2017	JTC	VOA2
109428-5	/ /				06/30/99	2050	JTC	VOA2
109428-6	/ /				06/30/99	2123	JTC	VOA2
109428-7	/ /				06/30/99	2156	JTC	VOA2
109428-8	/ /				06/30/99	2228	JTC	VOA2
109428-9	/ /				06/30/99	2301	JTC	VOA2
109428-10	/ /				06/30/99	2334	JTC	VOA2
DAYBLK 07/01	/ /				07/01/99	1005	JTC	VOA2
1094289-11	/ /				07/01/99	0007	JTC	VOA2
109428-12	/ /				07/01/99	0040	JTC	VOA2
109428-5MS	/ /				07/01/99	0113	JTC	VOA2
109428-5MSD	/ /				07/01/99	0146	JTC	VOA2
109428-11	/ /				07/01/99	0007	JTC	VOA2
DAYBLK 07/12	/ /				07/12/99	1334	JTC	VOA2
109428-12DUP	/ /				07/12/99	1519	JTC	VOA2

Analytical Services Inc. Batch QC
For Report Number :109428

QC Batch General Information

Batch Number	Analyte	Analysis Method	Matrix		Blank Result	Prep. Method
48711	Tl	EPA 7841	Aqueous	<	0.0010	
48711	As	EPA 7060	Aqueous	<	0.0050	
48711	Se	EPA 7740	Aqueous	<	0.0300	
48723	Ag	EPA 6010	Aqueous	<	0.0100	
48723	Ba	EPA 6010	Aqueous	<	0.0100	
48723	Be	EPA 6010	Aqueous	<	0.0030	
48723	Cd	EPA 6010	Aqueous	<	0.0050	
48723	Cr	EPA 6010	Aqueous	<	0.0100	
48723	Cu	EPA 6010	Aqueous	<	0.0200	
48723	Ni	EPA 6010	Aqueous	<	0.0200	
48723	Pb	EPA 6010	Aqueous	<	0.0050	
48723	Sb	EPA 6010	Aqueous	<	0.0060	
48723	Zn	EPA 6010	Aqueous	<	0.0200	
48736	Tl	EPA 7841	Soil	<	0.0010	
48736	As	EPA 7060	Soil	<	0.0050	
48736	Se	EPA 7740	Soil	<	0.0050	
48742	Ag	EPA 6010	Soil	<	0.0100	
48742	Ba	EPA 6010	Soil	<	0.0100	
^^Note : BATCH PASSES ON LCS/LCSD/MS/PDS						
48742	Be	EPA 6010	Soil	<	0.0100	
48742	Cd	EPA 6010	Soil	<	0.0100	
48742	Cr	EPA 6010	Aqueous	<	0.0100	
^^Note : BATCH PASSES ON LCS/LCSD/PDS						
48742	Cu	EPA 6010	Soil	<	0.0200	
48742	Ni	EPA 6010	Soil	<	0.0200	
48742	Pb	EPA 6010	Soil	<	0.0250	
48742	Sb	EPA 6010	Solid	<	0.0500	
48742	Zn	EPA 6010	Soil	<	0.0200	
49103	Hg	EPA 7470	Aqueous	<	0.0005	
49107	Hg	EPA 7471	Soil	<	0.2500	
49688	CN	EPA 9014	Aq/Solid	<	0.0200	
49737	CN	EPA 9014	Aq/Solid	<	0.2000	

Analytical Services Inc. Batch QC
For Report Number :109428

Lab Control Information

Batch Number	Analyte	Method	LC %Rec	LCD %Rec	LC RPD	%Recovery Range	RPD Range
48711	Tl	EPA 7841	102	102	0	76 - 124	0 - 20
48711	As	EPA 7060	90	89	1	76 - 124	0 - 20
48711	Se	EPA 7740	98	83	17	76 - 124	0 - 20
48723	Ag	EPA 6010	100	100	0	76 - 124	0 - 20
48723	Ba	EPA 6010	98	96	2	76 - 124	0 - 20
48723	Be	EPA 6010	98	97	1	76 - 124	0 - 20
48723	Cd	EPA 6010	99	97	2	76 - 124	0 - 20
48723	Cr	EPA 6010	100	100	0	76 - 124	0 - 20
48723	Cu	EPA 6010	100	98	2	76 - 124	0 - 20
48723	Ni	EPA 6010	98	96	2	76 - 124	0 - 20
48723	Pb	EPA 6010	100	100	0	76 - 124	0 - 20
48723	Sb	EPA 6010	100	99	1	76 - 124	0 - 20
48723	Zn	EPA 6010	100	99	1	76 - 124	0 - 20
48736	Tl	EPA 7841	95	96	1	76 - 124	0 - 30
48736	As	EPA 7060	85	91	7	76 - 124	0 - 30
48736	Se	EPA 7740	107	113	5	76 - 124	0 - 30
48742	Ag	EPA 6010	89	84	6	76 - 124	0 - 30
48742	Ba	EPA 6010	87	82	6	76 - 124	0 - 30
48742	Be	EPA 6010	90	85	6	76 - 124	0 - 30
8742	Cd	EPA 6010	86	81	6	76 - 124	0 - 30
48742	Cr	EPA 6010	91	85	7	76 - 124	0 - 20
48742	Cu	EPA 6010	88	83	6	76 - 124	0 - 30
48742	Ni	EPA 6010	82	78	5	76 - 124	0 - 30
48742	Pb	EPA 6010	82	78	5	76 - 124	0 - 30
48742	Sb	EPA 6010	82	78	5	76 - 124	0 - 30
48742	Zn	EPA 6010	86	81	6	76 - 124	0 - 30
49103	Hg	EPA 7470	91	95	4	76 - 124	0 - 20
49107	Hg	EPA 7471	110	110	0	76 - 124	0 - 30
49688	CN	EPA 9014	87	90	3	85 - 115	0 - 30
49737	CN	EPA 9014	96	92	4	85 - 115	0 - 30

Matrix Spike Information

Batch Number	Analyte	Method	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
48711	Tl	EPA 7841	74	53	33	65 - 121	0 - 20
48711	As	EPA 7060	63	59	7	25 - 140	0 - 22
48711	Se	EPA 7740	39	44	12	10 - 136	0 - 30
48723	Ag	EPA 6010	95	97	2	56 - 132	0 - 8
48723	Ba	EPA 6010	89	91	2	84 - 103	0 - 7
48723	Be	EPA 6010	88	90	2	85 - 103	0 - 9
48723	Cd	EPA 6010	88	90	2	84 - 102	0 - 8
48723	Cr	EPA 6010	92	94	2	86 - 103	0 - 8
48723	Cu	EPA 6010	92	95	3	81 - 101	0 - 8
48723	Ni	EPA 6010	86	88	2	86 - 101	0 - 7
48723	Pb	EPA 6010	91	93	2	89 - 103	0 - 8

Analytical Services Inc. Batch QC
For Report Number :109428

Matrix Spike Information

Batch Number	Analyte	Method	MS %Rec	MSD %Rec	MS RPD	%Recovery Range	RPD Range
48723	Sb	EPA 6010	83	83	0	83 - 110	0 - 7
48723	Zn	EPA 6010	88	93	6	81 - 107	0 - 11
48736	Tl	EPA 7841	95	94	1	58 - 113	0 - 16
48736	As	EPA 7060	67	79	16	43 - 125	0 - 25
48736	Se	EPA 7740	75	108	36	64 - 137	0 - 24
48742	Ag	EPA 6010	80	81	1	61 - 127	0 - 25
48742	Ba	EPA 6010	62	60	3	62 - 106	0 - 21
48742	Be	EPA 6010	75	75	0	59 - 104	0 - 16
48742	Cd	EPA 6010	70	70	0	61 - 109	0 - 20
48742	Cr	EPA 6010	85	75	13	86 - 103	0 - 8
48742	Cu	EPA 6010	69	69	0	57 - 112	0 - 24
48742	Ni	EPA 6010	69	67	3	56 - 106	0 - 22
48742	Pb	EPA 6010	68	65	5	61 - 107	0 - 20
48742	Sb	EPA 6010	42	48	13	25 - 102	0 - 23
48742	Zn	EPA 6010	79	77	3	52 - 115	0 - 28
49103	Hg	EPA 7470	79	87	10	73 - 119	0 - 17
49107	Hg	EPA 7471	69	0	NC	63 - 136	0 - 30
49688	CN	EPA 9014	88	88	0	61 - 118	0 - 13
49737	CN	EPA 9014	73	67	9	61 - 118	0 - 13

Post Digestion Spike Information

Batch Number	Analyte	Method	PDS %Rec	%Recovery Range
48711	Tl	EPA 7841	95	76 - 124
48711	As	EPA 7060	97	76 - 124
48711	Se	EPA 7740	116	76 - 124
48723	Ag	EPA 6010	110	76 - 124
48723	Ba	EPA 6010	100	76 - 124
48723	Be	EPA 6010	100	76 - 124
48723	Cd	EPA 6010	100	76 - 124
48723	Cr	EPA 6010	110	76 - 124
48723	Cu	EPA 6010	100	76 - 124
48723	Ni	EPA 6010	100	76 - 124
48723	Pb	EPA 6010	100	76 - 124
48723	Sb	EPA 6010	100	76 - 124
48723	Zn	EPA 6010	120	76 - 124
48736	Tl	EPA 7841	105	76 - 124
48736	As	EPA 7060	92	76 - 124
48736	Se	EPA 7740	94	76 - 124
48742	Ag	EPA 6010	96	76 - 124
48742	Ba	EPA 6010	78	76 - 124
48742	Be	EPA 6010	88	76 - 124
48742	Cd	EPA 6010	82	76 - 124
48742	Cr	EPA 6010	91	76 - 124
48742	Cu	EPA 6010	84	76 - 124

Analytical Services Inc. Batch QC
For Report Number :109428

Post Digestion Spike Information

Batch Number	Analyte	Method	PDS %Rec	%Recovery Range
48742	Ni	EPA 6010	78	76 - 124
48742	Pb	EPA 6010	79	76 - 124
48742	Sb	EPA 6010	82	76 - 124
48742	Zn	EPA 6010	90	76 - 124

Unspiked Sample Duplicate Information

Batch Number	Analyte	Method	Sample 1 RPD	Sample 2 RPD	RPD Range
49103	Hg	EPA 7470	20		0 - 17
49107	Hg	EPA 7471	10		0 - 30
49688	CN	EPA 9014	18		0 - 13
49737	CN	EPA 9014	0		0 - 13

Q.C. Information for Batch # 48711 For Report Number :109428

Sample Batch Information
Analysis : Tl, As, Se

Sample ID	Tag	Preparation Date	Time	By	Preparation Notes	Analysis Date	Time	By	Inst
48711BLANK	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
48711LCS	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
48711LCSD	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-5MS	Tl	06/24/99	0905	ELK	AKA 109373-1	06/25/99	1222	DCF	AA2
109373-6MSD	Tl	06/24/99	0905	ELK	AKA 109373-1	06/25/99	1222	DCF	AA2
109428-2PDS	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109428-2DUP	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-1	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-2	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-3	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-4	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-7	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109373-8	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109390-1	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109428-1	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109428-2	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
109428-3	Tl	06/24/99	0905	ELK	GFAA	06/25/99	1222	DCF	AA2
48711BLANK	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
48711LCS	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
48711LCSD	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109373-5MS	Se	06/24/99	0905	ELK	AKA 109373-1	06/28/99	0927	RCP	AA3
109373-6MSD	Se	06/24/99	0905	ELK	AKA 109373-1	06/28/99	0927	RCP	AA3
109428-2PDS	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109428-2DUP	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109373-1	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109373-2	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109373-3	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109373-4	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109373-7	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109373-8	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109390-1	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109428-1	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109428-2	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
109428-3	Se	06/24/99	0905	ELK	GFAA	06/28/99	0927	RCP	AA3
48711BLANK	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
48711LCS	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
48711LCSD	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109373-5MS	As	06/24/99	0905	ELK	AKA 109373-1	06/28/99	1308	RCP	AA1
109373-6MSD	As	06/24/99	0905	ELK	AKA 109373-1	06/28/99	1308	RCP	AA1
109428-2PDS	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109428-2DUP	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109373-1	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109373-2	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109373-3	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109373-4	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109373-7	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109373-8	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109390-1	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1

Q.C. Information for Batch # 48711 For Report Number :109428

Sample Batch Information
Analysis : Tl, As, Se

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
109428-1	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109428-2	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1
109428-3	As	06/24/99	0905	ELK	GFAA	06/28/99	1308	RCP	AA1

Q.C. Information for Batch # 48723 For Report Number :109428

Sample Batch Information
Analysis : Ag, Ba, Be, Cd, Cr, Cu, Ni, Pb, Sb, Zn

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
48723BLANK		06/25/99	1300	ELK	TRACE	06/28/99	1723	MAB	ICP2
48723LCS		06/25/99	1300	ELK	TRACE	06/28/99	1727	MAB	ICP2
48723LCSD		06/25/99	1300	ELK	TRACE	06/28/99	1731	MAB	ICP2
109373-5MS		06/25/99	1300	ELK	AKA 109373-1	06/28/99	1639	MAB	ICP2
109373-6MSD		06/25/99	1300	ELK	AKA 109373-1	06/28/99	1643	MAB	ICP2
109373-7PDS		06/25/99	1300	ELK	TRACE	06/28/99	1736	MAB	ICP2
109373-8DUP		06/25/99	1300	ELK	TRACE	06/28/99	1740	MAB	ICP2
109373-1RR		06/25/99	1300	ELK	TRACE	06/28/99	1648	MAB	ICP2
109373-2RR		06/25/99	1300	ELK	TRACE	06/28/99	1652	MAB	ICP2
109373-3RR		06/25/99	1300	ELK	TRACE	06/28/99	1656	MAB	ICP2
109373-4RR		06/25/99	1300	ELK	TRACE	06/28/99	1701	MAB	ICP2
109373-7RR		06/25/99	1300	ELK	TRACE	06/28/99	1705	MAB	ICP2
109373-8RR		06/25/99	1300	ELK	TRACE	06/28/99	1709	MAB	ICP2
109390-1RR		06/25/99	1300	ELK	TRACE	06/28/99	1744	MAB	ICP2
109428-1RR		06/25/99	1300	ELK	TRACE	06/28/99	1749	MAB	ICP2
109428-2RR		06/25/99	1300	ELK	TRACE	06/28/99	1753	MAB	ICP2
109428-3RR		06/25/99	1300	ELK	TRACE	06/28/99	1758	MAB	ICP2

Sample Batch Information
Analysis : Tl, As, Se

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
48736BLANK	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
48736LCS	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
48736LCSD	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-5MS	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-5MSD	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-5PDS	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-5DUP	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-5	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-6	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-7	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-8	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-9	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-10	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-11	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
109428-12	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
HPS148736	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
HPS248736	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
SANDBLANK48736	Tl	06/29/99	1015	RAF	GFAA	06/30/99	0710	DCF	AA2
8736BLANK	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
48736LCS	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
48736LCSD	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-5MS	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-5MSD	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-5PDS	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-5DUP	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-5	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-6	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-7	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-8	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-9	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-10	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-11	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
109428-12	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
HPS148736	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
HPS248736	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
SANDBLANK48736	As	06/29/99	1015	RAF	GFAA	07/01/99	0753	DCF	AA1
48736BLANK	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
48736LCS	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
48736LCSD	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-5MS	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-5MSD	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-5PDS	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-5DUP	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-5	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-6	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-7	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-8	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-9	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1

Q.C. Information for Batch # 48736 For Report Number :109428

Sample Batch Information
Analysis : Tl, As, Se

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
109428-10	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-11	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
109428-12	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
HPS148736	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
HPS248736	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1
SANDBLANK48736	Se	06/29/99	1015	RAF	GFAA	07/02/99	1325	DCF	AA1

Q.C. Information for Batch # 48742 For Report Number :109428

Sample Batch Information

Analysis : Ag, Ba, Be, Cd, Cr, Cu, Ni, Pb, Sb, Zn

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Ins
48742BLANK		06/30/99	1000	RAF	TRACE	06/30/99	2032	MAB	ICP
48742LCS		06/30/99	1000	RAF	TRACE	06/30/99	2036	MAB	ICP
48742LCSD		06/30/99	1000	RAF	TRACE	06/30/99	2041	MAB	ICP
109428-5MS		06/30/99	1000	RAF	TRACE	06/30/99	2045	MAB	ICP
109428-5MSD		06/30/99	1000	RAF	TRACE	06/30/99	2049	MAB	ICP
109428-5PDS		06/30/99	1000	RAF	TRACE	06/30/99	2054	MAB	ICP
109428-5DUP		06/30/99	1000	RAF	TRACE	06/30/99	2058	MAB	ICP
109428-5		06/30/99	1000	RAF	TRACE	06/30/99	2103	MAB	ICP
109428-6		06/30/99	1000	RAF	TRACE	06/30/99	2107	MAB	ICP
109428-7		06/30/99	1000	RAF	TRACE	06/30/99	2112	MAB	ICP
109428-8		06/30/99	1000	RAF	TRACE	06/30/99	2125	MAB	ICP
109428-9		06/30/99	1000	RAF	TRACE	06/30/99	2130	MAB	ICP
109428-10		06/30/99	1000	RAF	TRACE	06/30/99	2134	MAB	ICP
109428-11		06/30/99	1000	RAF	TRACE	06/30/99	2139	MAB	ICP
109428-12		06/30/99	1000	RAF	TRACE	06/30/99	2143	MAB	ICP
HPS		06/30/99	1000	RAF	TRACE	06/30/99	2156	MAB	ICP
HPS		06/30/99	1000	RAF	TRACE	06/30/99	2201	MAB	ICP
SAND BLANK		06/30/99	1000	RAF	TRACE	06/30/99	2152	MAB	ICP

Q.C. Information for Batch # 49103 For Report Number :109428

Sample Batch Information
Analysis : Hg

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
49103BLANK	Hg	06/25/99	0935	MLR	AQU	06/25/99	1359	MLR	HG1
49103LCS	Hg	06/25/99	0935	MLR	AQU	06/25/99	1402	MLR	HG1
49103LCSD	Hg	06/25/99	0935	MLR	AQU	06/25/99	1404	MLR	HG1
109373-5MS	Hg	06/25/99	0935	MLR	AKA 109373-1	06/25/99	1407	MLR	HG1
109373-6MSD	Hg	06/25/99	0935	MLR	AKA 109373-1	06/25/99	1409	MLR	HG1
109373-6DUP	Hg	06/25/99	0935	MLR	AKA 109373-1	06/25/99	1412	MLR	HG1
109373-1	Hg	06/25/99	0935	MLR	AQU	06/25/99	1414	MLR	HG1
109373-2	Hg	06/25/99	0935	MLR	AQU	06/25/99	1417	MLR	HG1
109373-3	Hg	06/25/99	0935	MLR	AQU	06/25/99	1419	MLR	HG1
109373-4	Hg	06/25/99	0935	MLR	AQU	06/25/99	1422	MLR	HG1
109373-5	Hg	06/25/99	0935	MLR	AQU	06/25/99	1430	MLR	HG1
109373-6	Hg	06/25/99	0935	MLR	AQU	06/25/99	1432	MLR	HG1
109373-7	Hg	06/25/99	0935	MLR	AQU	06/25/99	1435	MLR	HG1
109373-8	Hg	06/25/99	0935	MLR	AQU	06/25/99	1437	MLR	HG1
109390-1	Hg	06/25/99	0935	MLR	AQU	06/25/99	1439	MLR	HG1
109428-2	Hg	06/25/99	0935	MLR	AQU	06/25/99	1444	MLR	HG1
109428-3	Hg	06/25/99	0935	MLR	AQU	06/25/99	1447	MLR	HG1
109428-1	Hg	06/25/99	0935	MLR	AQU	06/25/99	1442	MLR	HG1

Q.C. Information for Batch # 49107 For Report Number :109428

Sample Batch Information
Analysis : Hg

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
49107BLANK	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1257	MLR	HG1
49107LCS	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1300	MLR	HG1
49107LCSD	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1302	MLR	HG1
109428-5MS	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1305	MLR	HG1
109428-5MSD	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1307	MLR	HG1
109428-5DUP	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1310	MLR	HG1
109428-10	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1330	MLR	HG1
109428-11	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1333	MLR	HG1
109428-12	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1335	MLR	HG1
109428-5	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1312	MLR	HG1
109428-6	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1315	MLR	HG1
109428-7	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1317	MLR	HG1
109428-8	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1320	MLR	HG1
109428-9	Hg	06/25/99	0945	MLR	SOIL	06/25/99	1328	MLR	HG1

Q.C. Information for Batch # 49688 For Report Number :109428

Sample Batch Information
Analysis : CN

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
49688BLK		06/29/99	1745	HH	MIDI-DIST	06/30/99	1120	HH	GENE
49688LCS		06/29/99	1745	HH	MIDI-DIST	06/30/99	1120	HH	GENE
49688LCSD		06/29/99	1745	HH	MIDI-DIST	06/30/99	1120	HH	GENE
109428-1		06/29/99	1220	HH	MIDI-DIST	06/29/99	1915	HH	GENE
109428-2		06/29/99	1220	HH	MIDI-DIST	06/29/99	1915	HH	GENE
109428-3		06/29/99	1745	HH	MIDI-DIST	06/30/99	1120	HH	GENE
109428-2MS		06/29/99	1745	HH	MIDI-DIST	06/30/99	1120	HH	GENE
109428-2MSD		06/29/99	1745	HH	MIDI-DIST	06/30/99	1120	HH	GENE
109428-2DUP		06/29/99	1745	HH	MIDI-DIST	06/30/99	1120	HH	GENE
CALCK5		06/29/99	1220	HH	MIDI-DIST	06/29/99	1915	HH	GENE
CALCK15		06/29/99	1220	HH	MIDI-DIST	06/29/99	1915	HH	GENE

Q.C. Information for Batch # 49737   For Report Number :109428

Sample Batch Information
Analysis : CN

Sample ID	Tag	Preparation Date	Preparation Time	Preparation By	Preparation Notes	Analysis Date	Analysis Time	Analysis By	Inst
49737BLK		06/29/99	0930	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-5		06/29/99	0930	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-6		06/29/99	0930	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-7		06/29/99	0930	HH	MIDI-DIST	06/29/99	1915	HH	GENI
49737LCS		06/29/99	0930	HH	MIDI-DIST	06/29/99	1915	HH	GENI
49737LCSD		06/29/99	0930	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-8		06/29/99	0930	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-9		06/29/99	0930	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-10		06/29/99	0930	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-10DUP		06/29/99	0930	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-11		06/29/99	1220	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-12		06/29/99	1220	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-11MS		06/29/99	1220	HH	MIDI-DIST	06/29/99	1915	HH	GENI
109428-11MSD		06/29/99	1220	HH	MIDI-DIST	06/29/99	1915	HH	GENI
CALCK5		06/29/99	1220	HH	MIDI-DIST	06/29/99	1915	HH	GENI
CALCK15		06/29/99	1220	HH	MIDI-DIST	06/29/99	1915	HH	GENI

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

Laboratory Task Order No. 09619

VZ3 3P3

CHAIN-OF-CUSTODY RECORD

Project Number TF0003200016
Project Location SLOSS INDUSTRIES / BHAM
Laboratory ASI
Sampler(s)/Affiliation JASON KIRKPATRICK
AARON STEARNS

SAMPLE BOTTLE / CONTAINER DESCRIPTION

ASI # 109428

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	VOC's (EPA 8260) 40 ml VOA vials / HCl / on ice abc	SVOC's (EPA 8270) 1 liter Amber glass / no pres. / on ice gh	CYANIDE 950 ml plastic w/ NaOH / on ice f	P.P. metals + Barium 500 ml plastic HNO3 / on ice d	MERCURY 500 ml glass HNO3 / on ice e		VOC's (ENCORE) 5 gram ENCORE sampler no pres. / on ice			TOTAL
0621-BT-13-GW0044	L	6/21/99 0900		3	2	1	1	1				-1	8
0621-BT-13-GW0038	L	1210		3								-2	3
0621-BT-13-GW0039	L	1045		3								-3	3
0621-BT-13-TB0004	L	—		2								-4	2
0621-BT-13-SL0043	S	1326								2		-5 ab	2
0621-BT-13-SL0042	S	1355								2		-6 ab	2
0621-BT-13-SL0041	S	1400								2		-7 ab	2
0621-BT-13-SL0038A	S	1435								2		ab	2
0621-BT-13-SL0038B	S	1435				COMPOSITE VOC's *				2		-8 hi	2
0621-BT-13-SL0038C	S	1435								2		JK	2
0621-BT-13-SL0039A	S	1515								2		ab	2
0621-BT-13-SL0039B	S	1515				COMPOSITE VOC's *				2		-9 hi	2
0621-BT-13-SL0039C	S	1515								2		JK	2
0621-BT-13-SL0039D	S	1515								2		lm	2
0621-BT-13-SL0040A	S	1610								2		-10 ab	2

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers: TOTAL NEXT PG

Relinquished by: [signature]	Organization: ARCADIS Geraghty & Miller	Date 6/21/99	Time 1930	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by: S. Jackson	Organization:	Date 6/22/99	Time 9:10Am	

Special Instructions/Remarks: VCC, seal intact, temp = 1°C 9:30am, pH = 1(metals) 12(CN)
SEE COMMENTS ON PAGE 2, COMPOSITE ENCORES (VOC's) FOR SELECT LOCATIONS.
[signature] 6/22/99

305

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

Laboratory Task Order No. 09619

CHAIN-OF-CUSTODY RECORD

A&T II
109428

Project Number: TF0003200016

Project Location: SLOSS INDUSTRIES / B-HAM

Laboratory: ASI

Sampler(s)/Affiliation: JASON KIRKPATRICK, AARON STEARNS.

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID							VOC's (8260) 5 gram ENCORE sampler no pres. / on ice		TEMP. BLANK	TOTAL
0621-BT-13-SL0040B	S	6/21/99/1610							COMPOSITE VOC's *	2		-10 hi	2
0621-BT-13-SL0040C	S	1610								2		JK	2
0621-BT-13-SL0044A	S	1645								2		ab	2
0621-BT-13-SL0044B	S	1645							COMPOSITE VOC's *	2		hi	2
0621-BT-13-SL0044C	S	1645								2		-11 JK	2
0621-BT-13-SL0044D	S	1645								2		lm	2
10621-BT-13-SL0044E	S	1645								2		nO	2
10621-BT-13-SL0000	S	1730								2		-12	2
TEMP BLANK	—											1	1

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/ Containers: 55

Relinquished by: [signature]	Organization: ARCADIS Geraghty & Miller	Date 6/21/99	Time 1930	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by: S. Jackson	Organization:	Date 6/22/99	Time 9:10am	

Special Instructions/Remarks: Ice, seal intact temp = 1°C 9:30AM, pH = 1 (metals) 12 (CN)
* COMPOSITE ENCORES (VOC's) IN LAB FOR SAMPLES IN BRACKETS - 4 SETS TO COMPOSITE (SL0038, SL0039, SL0040 + SL0044). CONTACT KATHY THALMAN w/ QUESTIONS (813) 961-1921

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

Laboratory Task Order No. 09619

CHAIN-OF-CUSTODY RECORD

Project Number TF000320.0016

Project Location Sloss Industries / B-HAM

Laboratory ASI

Sampler(s)/Affiliation Aaron Stearns
Jason Kirkpatrick

SAMPLE BOTTLE / CONTAINER DESCRIPTION

ASI # 109428

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	~~d~~e SVOC's (EPA 8270 C) 1 liter amber glass no pres./on ice	c Priority Pollutant Metals + Barium 500 mL plastic w/ HNO3 on ice	g Mercury (Hg) 500 mL glass HNO3 on ice	f Cyanide (9010/9014) NaOH on ice			Temperature Blank			TOTAL
621- BT-IW-SL0038	S	6/21/99 1435		2	1	1	1					-8	5
621- BT-IW-SL0039	S	1515		2	1	1	1					-9	5
621- BT-IW-SL0040	S	1610		2	1	1	1					-10	5
621- BT-IW-SL0041	S	1415		2	1	1	1					-7	5
621- BT-IW-SL0042	S	1355		2	1	1	1					-6	5
621- BT-IW-SL0043	S	1335		2	1	1	1					-5	5
621- BT-IW-SL0044	S	1645		2	1	1	1					-11	5
621- BT-IW-SL0000	S	1730		2	1	1	1					-12	5
Temp. Blank										1			1

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 41

Relinquished by: Aaron Stearns	Organization: ARCADIS Geraghty + Miller	Date 6/21/99	Time 1900	Seal Intact?
Received by:	Organization:	Date / /	Time	Yes No N/A
Relinquished by:	Organization:	Date / /	Time	Seal Intact?
Received by: S. Jackson	Organization:	Date 6/22/99	Time 9:10 AM	Yes No N/A

Special Instructions/Remarks: WL, seal intact, temp = 1°C 9:38 AM, pH = 1 (metals) 12 (CN)

6/22/99

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

Laboratory Task Order No. 09619

CHAIN-OF-CUSTODY RECORD

Project Number TF0003200016

Project Location SLOSS INDUSTRIES / B-HAM

Laboratory ASI

Sampler(s)/Affiliation JASON KIRKPATRICK
AARON STEARNS

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	SVOCs (8270) 1 liter Amber Glass no pres. / on ice	CYANIDE 950 ml plastic w/ NaOH / on ice	P.P. METALS + BARIUM 500 ml plastic w/ HNO3 / on ice	MERCURY 500 ml glass w/ HNO3 / on ice		TEMP. BLANK				TOTAL
0621-BT-13-GW0038	L	6/21/99 1210		2	1	1	1					-2	5
0621-BT-13-GW0039	L	6/21/99 1045		2	1	1	1					-3	5
TEMP. BLANK									1				1

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 11

Relinquished by: Jason Kirkpatrick	Organization: ARCADIS Geraghty + Miller	Date 6/21/99	Time 1930	Seal Intact?
Received by:	Organization:	Date / /	Time	Yes No N/A
Relinquished by:	Organization:	Date / /	Time	Seal Intact?
Received by: S. Jackson	Organization:	Date 6/22/99	Time 9:10Am	Yes No N/A

Special Instructions/Remarks: ice, seal intact, temp = 1°c, pH = 1 (metals) 12 (CN)

GERAGHTY & MILLER, INC.
Environmental and Infrastructure
a heidemij company

Laboratory Task Order No. 09611

CHAIN-OF-CUSTODY RECORD

oject Number 1TF000?.0001L

oject Location ... / Calam

boratory ASI

ampler(s)/Affiliation Jason Kirkpatrick
Aaron Siegfried

SAMPLE BOTTLE / CONTAINER DESCRIPTION

AMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	VOCs ... 40 ml VOA vials HCl / on ice	SVOCs ... 1 liter amber ... on ice	Cyanide ... 250 ml plastic NaOH / on ice	... metals ... 500 ml plastic HNO3 / on ice	Mercury 500 ml plastic HNO3 / on ice		VOCs (Encore) 5 gram Encore samplers no pres / on ice			TOTAL
BT-13-GW0044	L	6/21/99 0900		3	2	1	1	1					8
BT-13-GW0038	L	1210		3									3
BT-13-GW0039	L	1045		3									3
BT-13-TBC001	L	---		2									2
BT-IW-SL0043	S	1325								2			2
BT-IW-SL0042	S	1355								2			2
BT-IW-SL0041	S	1400								2			2
BT-IW-SL0038A	S	1435				composite VOCs				2			2
BT-IW-SL0038B	S	1435								2			2
BT-IW-SL0038C	S	1435								2			2
BT-IW-SL0037A	S	1515								2			2
BT-IW-SL0037B	S	1515				composite VOCs				2			2
BT-IW-SL0037C	S	1515								2			2
BT-IW-SL0037D	S	1515								2			2
BT-IW-SL0040	S	1610								2			2

mple Code: L - Liquid; S - Solid; A - Air

Total No. of Bottles/Containers: Total next pg

elinquished by: Jason Kirkpatrick Organization: Arcadis Geraghty & Miller Date 6/21/99 Time 1930
eceived by: Organization: Date / / Time
Seal Intact? Yes No N/A

elinquished by: Organization: Date / / Time
eceived by: Organization: Date / / Time
Seal Intact? Yes No N/A

ecial Instructions/Remarks:
SEE COMMENTS ON PAGE 2. COMPOSITE ENCORES (VOCs) FOR SELECT LOCATIONS.

elivery Method: ☐ In Person ☐ Common Carrier ______ SPECIFY ☒ Lab Courier ☐ Other ______ SPECIFY

Jun-22-99 09:43A P.02

309

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

Laboratory Task Order No. 01619

CHAIN-OF-CUSTODY RECORD

Project Number TF0005.0016

Project Location SLOSS INDUSTRIES / B'HAM

Laboratory ASI

Sampler(s)/Affiliation JASON KIRKPATRICK
AARON STEARNS

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID							VOCs (8260) 5 gram ENCORE samplers / on ice		TEMP BLANK	TOTAL
BT-IW-SL0040B	S	6/21/99 1610					COMPOSITE VOC *			2			2
BT-IW-SL0040C	S	1610								2			2
BT-IW-SL0044A	S	1645								2			2
BT-IW-SL0044B	S	1645					COMPOSITE VOC *			2			2
BT-IW-SL0044C	S	6/21/99 1645								2			2
BT-IW-SL0044D	S	1645								2			2
BT-IW-SL0044	S	1645								2			2
BT-IW-SL0002	S	1130								2			2
TEMP BLANK	-											1	1

Sample Code: L - Liquid; S - Solid; A - Air

Total No. of Bottles/Containers 55

Relinquished by: [signature] Organization: Geraghty & Miller Date 6/21/99 Time 1730
Received by: Organization: Date / / Time

Seal Intact? Yes No N/A

Relinquished by: Organization: Date / / Time
Received by: Organization: Date / / Time

Seal Intact? Yes No N/A

Special Instructions/Remarks:
* COMPOSITE ENCORES (VOCs) IN LAB FOR SAMPLES IN BRACKETS - 4 SETS TO COMPOSITE (SL0038, SL0037, SL0040 & SL0044). CONTACT KERRY HALLMAN w/ QUESTIONS (813) 961-1921

Delivery Method: ☐ In Person ☐ Common Carrier SPECIFY ☒ Lab Courier ☐ Other SPECIFY

APPENDIX C

In-Situ Permeability Testing Data

7/24/99
mdt

TF000320.0073.0006

Sloss
Birmingham, AL
June 1999 Slug Tests

Well	Slug Test	K (ft/min)	
MW-38	in	0.00585	Confined
MW-38	out	0.004969	
MW-39	in	0.0007454	
MW-39	out	0.0007111	
MW-40	in	0.00004537	Possibly Suspect
MW-40	out	0.00002942	
MW-41	in	0.002518	Un-Confined
MW-41	out	0.002119	
MW-42	in	0.002254	
MW-42	out	0.00103	
MW-44	in	0.0007421	Confined
MW-44	out	0.001495	

Sloss, Birmingham, AL
Slug test Method
June 22, 1999 data set

SLUG TEST METHOD FOR UNCONFINED AQUIFERS

MHP 9/21/99

REFERENCE:

Bouwer, H. and R.C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol. 12, no. 3, pp. 423-428.

Zlotnik, V., 1994. Intrepretation of Slug and Packer Tests in Anisotropic Aquifers, Ground Water, vol. 32, no. 5, pp. 761-766.

ASSUMPTIONS:

aquifer has infinite areal extent
aquifer is homogeneous and of uniform thickness
aquifer potentiometric surface is initially horizontal
a volume of water, V, is injected into or discharged from the well instantaneously
aquifer is confined or unconfined
flow is steady

* Also note slug tests may underestimate K by one or more magnitudes

SOLUTION:

$$\ln(s_0) - \ln(s_t) = \frac{2KLt}{r_{ce}^2 \ln(r_e / r_{we})}$$

where:

s_0 = initial displacement in well due to instantaneous removal of water from well [L]
s_t = displacement in well at time t [L]
L = length of well screen [L]

$$r_{ce} = \sqrt{r_c^{\,2} + n\left(r_w^{\,2} - r_c^{\,2}\right)}$$

n = porosity of gravel pack [fraction]
$\ln(r_e/r_{we})$ = empirical "shape factor" determined from graphs provided in Bouwer and Rice (1976)
r_e = equivalent radius over which head loss occurs [L]

$$r_{we} = r_w\sqrt{\frac{K_z}{K_r}}$$

H = static height of water in well measured from base of well to statiic water level [L]

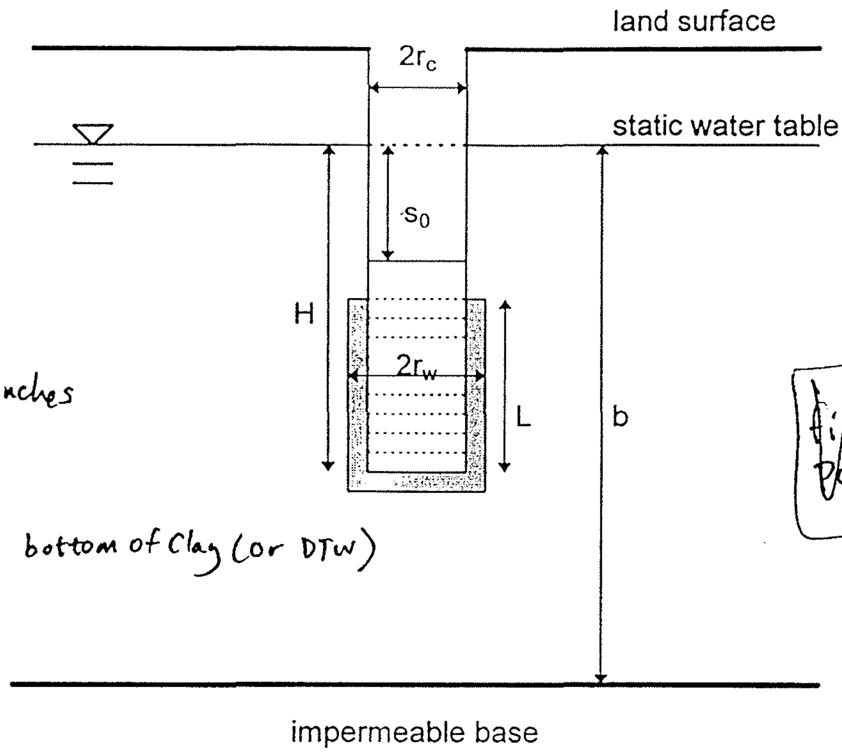
Bouwer and Rice (1976) recommend computing an equivalent casing radius (r_{ce}) to correct for the porosity of the gravel pack when the height of the static water column in the well is less than the screen length. If you specify a gravel pack porosity (n) equal to 0.0, AQTESOLV will not correct the casing radius.

Zlotnik (1994) advises the use of an equivalent wellbore radius (r_{we}) if the aquifer is anisotropic in a vertical plane. If you specify a vertical to horizontal hydraulic conductivity anisotropy ratio of 1.0, AQTESOLV will not correct the wellbore radius.

MJH 9/22/99

Aquifer Assumptions

based on Field data



2-inch ID MWs

10 ft screen

borehole radies = 6 inches

H = TD minus DTW

b = TD drilled minus bottom of Clay (or DTW)

~~filter porosity ε~~

Well #	r_c (ft)	r_w (ft)	TD	H	s_0	L (ft)	b	Comments	DTW
MW-38	0.08333	0.25	29.5	23.3	3.045 3.491	10	9		6.20
MW-39	↓	↓	32.0	25.89	3.443 3.358	↓	26.89		6.11
MW-40	↓	↓	27.5	17.89	3.014 2.527	↓	18.14	Data possibly suspect	9.61
MW-41	0.11049	↓	15.5	8.62	2.443 3.181	↓	7.75	r_c correction for screen across water table ↓ b = TD − DTW	6.88
MW-42	0.11049	↓	15.5	7.82	2.931 ~~[illegible]~~ 2.859	↓	8.32		7.68
MW-43	0.08333	↓	20.0	10.99	~~[illegible]~~	↓	10.25	data Suspect	9.01
MW-44	0.08333	↓	37.75	27.37	2.90 ~~[illegible]~~ 2.341	↓	17.75		10.38

Note: AQTESOLV requires H = b to run Program

ARCADIS
GERAGHTY & MILLER

SUBJECT: Sloss
Birmingham, AL
JOB NO: June 1999 Slug Tests

BY: MHH DATE: 9/22/99
CHKD: DATE:

PAGE 1
SHEET 1/1

Monitor wells MW-41 + MW-42 are screened across the water table

Therefore: per AG+M/Schafer proceedure, the casing radius for these two wells will be corrected for the effects of filling the filterpack.

$$r_c = \sqrt{r_c^2 + (r_w^2 - r_{os}^2)S_y}$$

where r_c = casing radius, 0.08333 ft

r_w = borehole radius, 0.25 ft

OD = 2.375"
r = 0.0990 ft

r_{os} = outside radius of screen, 0.0990 ft

S_y = specific yield of filterpack, 0.1

$$r_c = \sqrt{(0.08333 ft)^2 + [(0.25 ft)^2 - (0.0990 ft)^2]0.1}$$

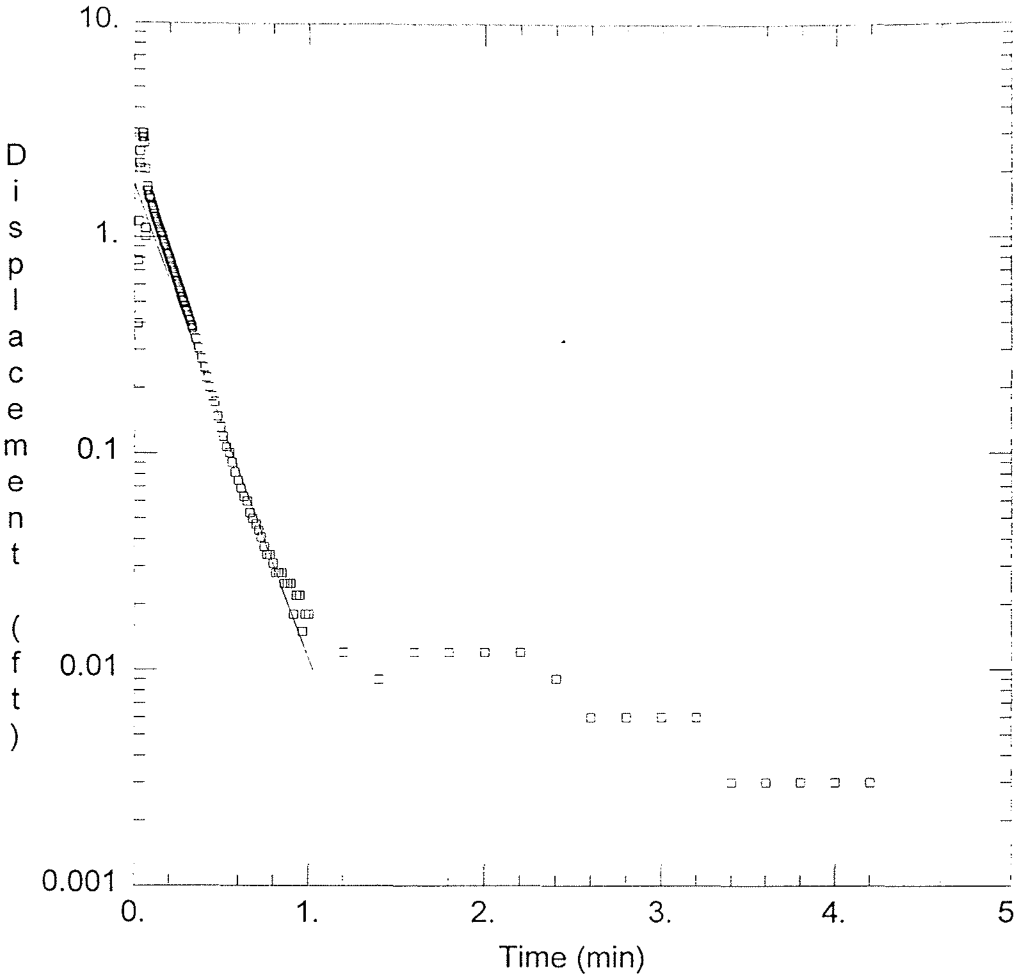
$$r_c = \sqrt{0.00694 + [(0.0625) - (0.0098)]0.1}$$

$$r_c = \sqrt{0.00694 + 0.00527}$$

$$r_c = 0.11049 ft$$

AGM Form 30 3-98

AG 30-1-97



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw38i.aqt
Date: 09/24/99 Time: 09:15:03

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0016.0013
Test Location: Birmingham, FL
Test Well: MW-38 Slug In
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 23.3 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-38i)

Initial Displacement: 3.045 ft Water Column Height: 23.3 ft
Casing Radius: 0.08333 ft Wellbore Radius: 0.25 ft
Screen Length: 10. ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw38i.aqt
Date: 09/24/99
Time: 09:15:10

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0016.0013
Location: Birmingham, FL
Test Date: June 1999
Test Well: MW-38 Slug In

AQUIFER DATA

Saturated Thickness: 23.3 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-38i

X Location: 0. ft
Y Location: 0. ft

No. of observations: 151

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.02	0.398	0.19	0.843	0.4666	0.173
0.0233	0.777	0.1933	0.827	0.4833	0.148
0.0266	1.178	0.1966	0.811	0.5	0.132
0.03	2.202	0.2	0.799	0.5166	0.12
0.0333	2.511	0.2033	0.783	0.5333	0.107
0.0366	2.091	0.2066	0.767	0.55	0.101
0.04	2.72	0.21	0.755	0.5666	0.091
0.0433	3.045	0.2133	0.742	0.5833	0.082
0.0466	2.894	0.2166	0.726	0.6	0.075
0.05	3.036	0.22	0.714	0.6166	0.069
0.0533	2.922	0.2233	0.701	0.6333	0.063
0.0566	2.745	0.2266	0.688	0.65	0.06
0.06	2.072	0.23	0.676	0.6666	0.053
0.0633	1.007	0.2333	0.663	0.6833	0.05
0.0666	1.099	0.2366	0.65	0.7	0.047
0.07	1.633	0.24	0.638	0.7166	0.044
0.0733	1.718	0.2433	0.625	0.7333	0.041
0.0766	1.636	0.2466	0.616	0.75	0.037

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.08	1.557	0.25	0.603	0.7666	0.034
0.0833	1.532	0.2533	0.593	0.7833	0.034
0.0866	1.51	0.2566	0.581	0.8	0.031
0.09	1.503	0.26	0.571	0.8166	0.028
0.0933	1.443	0.2633	0.559	0.8333	0.028
0.0966	1.409	0.2666	0.552	0.85	0.028
0.1	1.396	0.27	0.54	0.8666	0.025
0.1033	1.364	0.2733	0.527	0.8833	0.025
0.1066	1.342	0.2766	0.518	0.9	0.025
0.11	1.317	0.28	0.508	0.9166	0.018
0.1133	1.289	0.2833	0.502	0.9333	0.022
0.1166	1.266	0.2866	0.492	0.95	0.022
0.12	1.241	0.29	0.48	0.9666	0.015
0.1233	1.219	0.2933	0.473	0.9833	0.018
0.1266	1.197	0.2966	0.464	1.	0.018
0.13	1.175	0.3	0.454	1.2	0.012
0.1333	1.156	0.3033	0.448	1.4	0.009
0.1366	1.131	0.3066	0.439	1.6	0.012
0.14	1.108	0.31	0.432	1.8	0.012
0.1433	1.09	0.3133	0.423	2.	0.012
0.1466	1.071	0.3166	0.413	2.2	0.012
0.15	1.052	0.32	0.407	2.4	0.009
0.1533	1.033	0.3233	0.401	2.6	0.006
0.1566	1.011	0.3266	0.391	2.8	0.006
0.16	0.954	0.33	0.385	3.	0.006
0.1633	1.007	0.3333	0.379	3.2	0.006
0.1666	0.973	0.35	0.338	3.4	0.003
0.17	0.941	0.3666	0.306	3.6	0.003
0.1733	0.925	0.3833	0.274	3.8	0.003
0.1766	0.909	0.4	0.249	4.	0.003
0.18	0.894	0.4166	0.224	4.2	0.003
0.1833	0.875	0.4333	0.202		
0.1866	0.859	0.45	0.183		

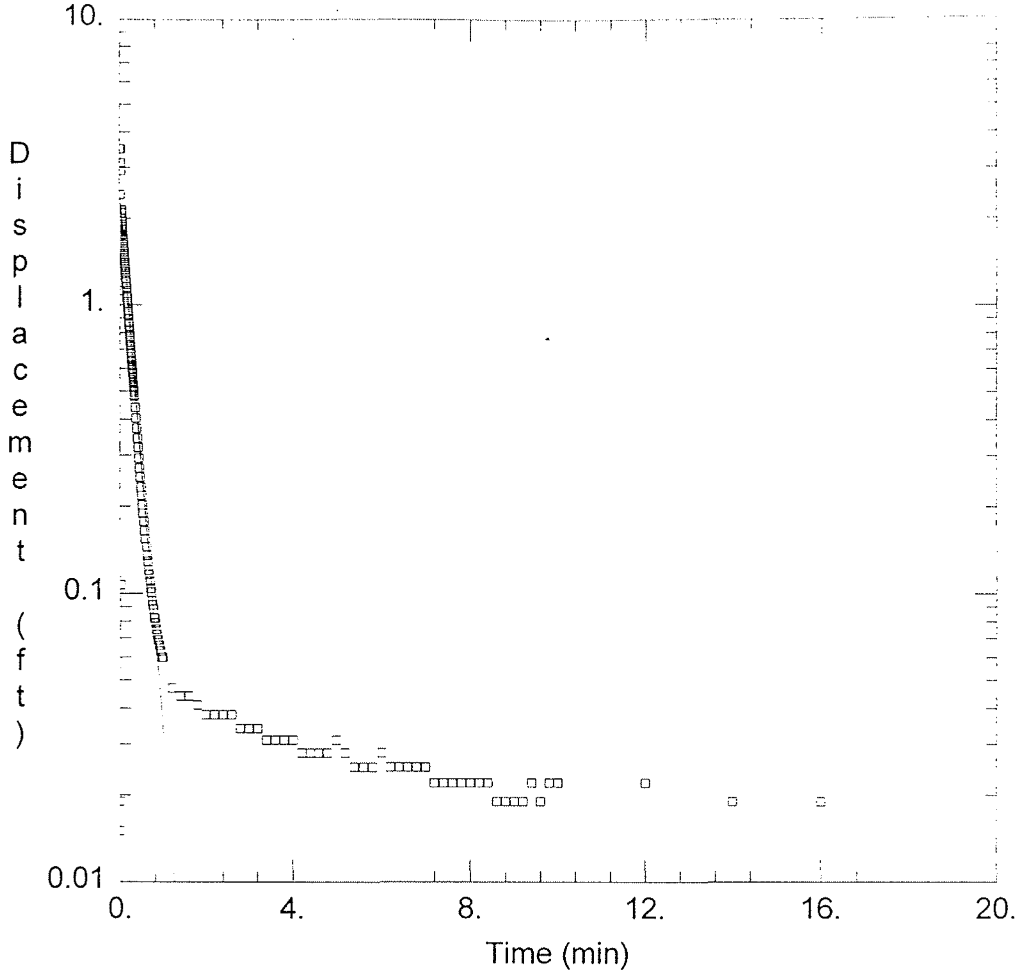
SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.00585	ft/min
y0	1.749	ft



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw38o.aqt
Date: 09/24/99 Time: 09:37:59

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0016.0013
Test Location: Birmingham, AL
Test Well: MW-38 Slug Out
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 23.3 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-38o)

Initial Displacement: 3.491 ft Water Column Height: 23.3 ft
Casing Radius: 0.08333 ft Wellbore Radius: 0.25 ft
Screen Length: 10. ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw38o.aqt
Date: 09/24/99
Time: 09:38:04

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0016.0013
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-38 Slug Out

AQUIFER DATA

Saturated Thickness: 23.3 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-38o

X Location: 0. ft
Y Location: 0. ft

No. of observations: 188

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0033	0.019	0.2133	0.84	0.7833	0.082
0.0066	0.015	0.2166	0.827	0.8	0.082
0.01	0.107	0.22	0.815	0.8166	0.079
0.0133	1.118	0.2233	0.802	0.8333	0.075
0.0166	1.737	0.2266	0.789	0.85	0.072
0.02	2.417	0.23	0.777	0.8666	0.069
0.0233	3.115	0.2333	0.764	0.8833	0.069
0.0266	3.491	0.2366	0.752	0.9	0.066
0.03	2.928	0.24	0.739	0.9166	0.066
0.0333	2.135	0.2433	0.726	0.9333	0.063
0.0366	2.094	0.2466	0.717	0.95	0.063
0.04	2.132	0.25	0.704	0.9666	0.06
0.0433	2.075	0.2533	0.695	0.9833	0.06
0.0466	2.022	0.2566	0.682	1.	0.06
0.05	1.981	0.26	0.673	1.2	0.047
0.0533	1.943	0.2633	0.66	1.4	0.044
0.0566	1.905	0.2666	0.65	1.6	0.044
0.06	1.87	0.27	0.641	1.8	0.041

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0633	1.832	0.2733	0.631	2.	0.038
0.0666	1.797	0.2766	0.622	2.2	0.038
0.07	1.763	0.28	0.613	2.4	0.038
0.0733	1.731	0.2833	0.603	2.6	0.038
0.0766	1.699	0.2866	0.594	2.8	0.034
0.08	1.671	0.29	0.584	3.	0.034
0.0833	1.639	0.2933	0.575	3.2	0.034
0.0866	1.611	0.2966	0.565	3.4	0.031
0.09	1.582	0.3	0.559	3.6	0.031
0.0933	1.554	0.3033	0.549	3.8	0.031
0.0966	1.526	0.3066	0.54	4.	0.031
0.1	1.497	0.31	0.534	4.2	0.028
0.1033	1.472	0.3133	0.524	4.4	0.028
0.1066	1.447	0.3166	0.518	4.6	0.028
0.11	1.421	0.32	0.508	4.8	0.028
0.1133	1.396	0.3233	0.502	5.	0.031
0.1166	1.371	0.3266	0.496	5.2	0.028
0.12	1.349	0.33	0.486	5.4	0.025
0.1233	1.323	0.3333	0.48	5.6	0.025
0.1266	1.301	0.35	0.439	5.8	0.025
0.13	1.279	0.3666	0.404	6.	0.028
0.1333	1.257	0.3833	0.372	6.2	0.025
0.1366	1.235	0.4	0.344	6.4	0.025
0.14	1.213	0.4166	0.319	6.6	0.025
0.1433	1.194	0.4333	0.293	6.8	0.025
0.1466	1.175	0.45	0.271	7.	0.025
0.15	1.153	0.4666	0.252	7.2	0.022
0.1533	1.134	0.4833	0.233	7.4	0.022
0.1566	1.115	0.5	0.218	7.6	0.022
0.16	1.096	0.5166	0.202	7.8	0.022
0.1633	1.077	0.5333	0.189	8.	0.022
0.1666	1.058	0.55	0.177	8.2	0.022
0.17	1.042	0.5666	0.164	8.4	0.022
0.1733	1.023	0.5833	0.154	8.6	0.019
0.1766	1.007	0.6	0.145	8.8	0.019
0.18	0.992	0.6166	0.135	9.	0.019
0.1833	0.976	0.6333	0.129	9.2	0.019
0.1866	0.957	0.65	0.12	9.4	0.022
0.19	0.944	0.6666	0.116	9.6	0.019
0.1933	0.928	0.6833	0.11	9.8	0.022
0.1966	0.913	0.7	0.104	10.	0.022
0.2	0.897	0.7166	0.101	12.	0.022
0.2033	0.884	0.7333	0.094	14.	0.019
0.2066	0.868	0.75	0.091	16.	0.019
0.21	0.856	0.7666	0.088		

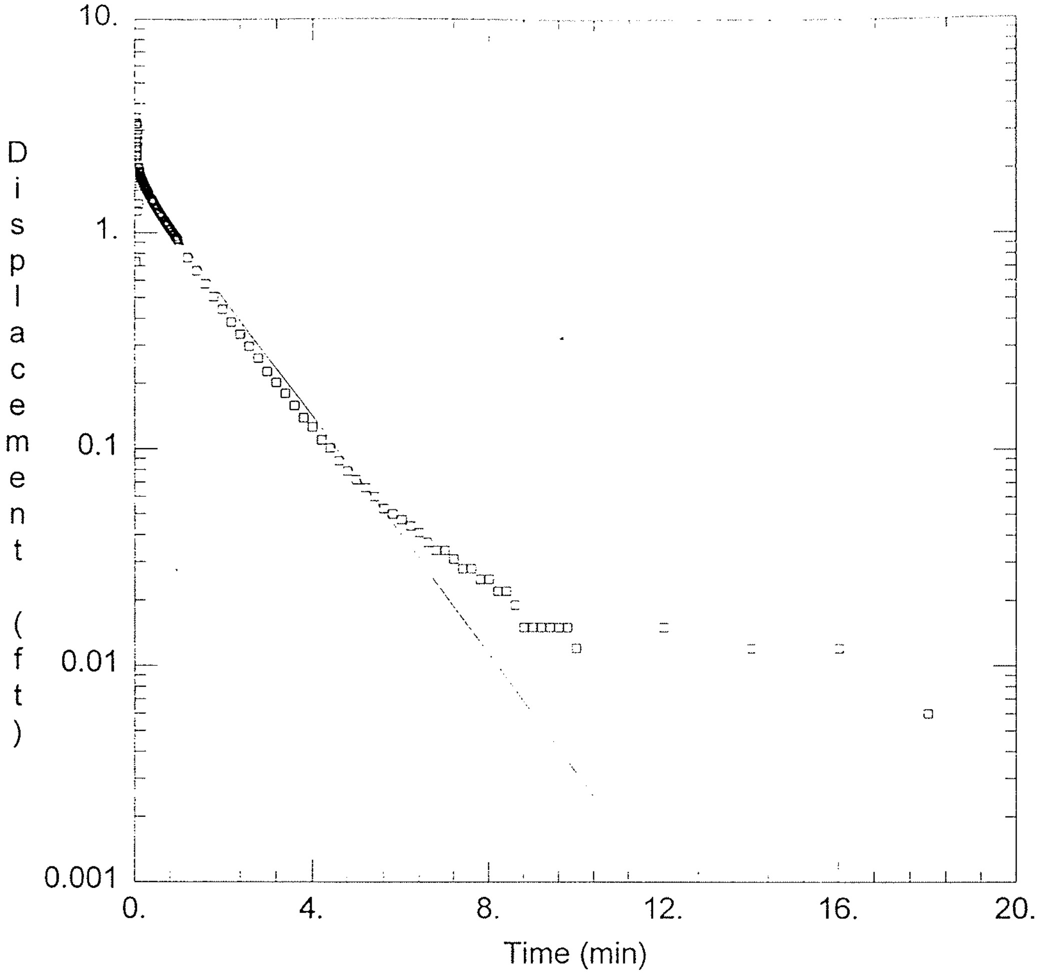
SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.004969	ft/min
y0	2.284	ft



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw39i.aqt
Date: 09/24/99 Time: 09:44:33

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF00320.0016.0013
Test Location: Birmingham, AL
Test Well: MW-39 Slug In
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 25.89 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-39i)

Initial Displacement: 3.443 ft Water Column Height: 25.89 ft
Casing Radius: 0.08333 ft Wellbore Radius: 0.25 ft
Screen Length: 10. ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

AQTESOLV for Windows

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw39i.aqt
Date: 09/24/99
Time: 09:44:42

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF00320.0016.0013
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-39 Slug In

AQUIFER DATA

Saturated Thickness: 25.89 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-39i

X Location: 0. ft
Y Location: 0. ft

No. of observations: 183

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0233	0.733	0.2266	1.661	0.8166	1.036
0.0266	1.864	0.23	1.652	0.8333	1.026
0.03	2.745	0.2333	1.649	0.85	1.014
0.0333	2.505	0.2366	1.643	0.8666	1.001
0.0366	2.255	0.24	1.636	0.8833	0.992
0.04	2.638	0.2433	1.63	0.9	0.979
0.0433	3.225	0.2466	1.623	0.9166	0.966
0.0466	3.443	0.25	1.62	0.9333	0.957
0.05	3.213	0.2533	1.614	0.95	0.944
0.0533	2.372	0.2566	1.608	0.9666	0.935
0.0566	1.257	0.26	1.608	0.9833	0.925
0.06	1.74	0.2633	1.598	1.	0.913
0.0633	2.116	0.2666	1.595	1.2	0.764
0.0666	2.293	0.27	1.589	1.4	0.666
0.07	2.502	0.2733	1.582	1.6	0.578
0.0733	2.853	0.2766	1.579	1.8	0.505
0.0766	3.14	0.28	1.573	2.	0.442
0.08	3.03	0.2833	1.57	2.2	0.385

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0833	2.654	0.2866	1.564	2.4	0.338
0.0866	1.693	0.29	1.56	2.6	0.297
0.09	1.355	0.2933	1.554	2.8	0.262
0.0933	1.643	0.2966	1.551	3.	0.227
0.0966	1.999	0.3	1.544	3.2	0.202
0.1	2.019	0.3033	1.538	3.4	0.18
0.1033	1.965	0.3066	1.535	3.6	0.158
0.1066	1.993	0.31	1.532	3.8	0.139
0.11	1.92	0.3133	1.526	4.	0.126
0.1133	1.927	0.3166	1.522	4.2	0.11
0.1166	1.914	0.32	1.519	4.4	0.101
0.12	1.905	0.3233	1.513	4.6	0.088
0.1233	1.895	0.3266	1.513	4.8	0.079
0.1266	1.886	0.33	1.503	5.	0.072
0.13	1.873	0.3333	1.5	5.2	0.066
0.1333	1.854	0.35	1.478	5.4	0.06
0.1366	1.832	0.3666	1.437	5.6	0.053
0.14	1.851	0.3833	1.434	5.8	0.05
0.1433	1.851	0.4	1.412	6.	0.047
0.1466	1.829	0.4166	1.393	6.2	0.044
0.15	1.819	0.4333	1.374	6.4	0.041
0.1533	1.816	0.45	1.355	6.6	0.037
0.1566	1.804	0.4666	1.339	6.8	0.034
0.16	1.794	0.4833	1.32	7.	0.034
0.1633	1.788	0.5	1.304	7.2	0.031
0.1666	1.781	0.5166	1.285	7.4	0.028
0.17	1.772	0.5333	1.27	7.6	0.028
0.1733	1.766	0.55	1.254	7.8	0.025
0.1766	1.756	0.5666	1.238	8.	0.025
0.18	1.75	0.5833	1.222	8.2	0.022
0.1833	1.744	0.6	1.206	8.4	0.022
0.1866	1.731	0.6166	1.194	8.6	0.019
0.19	1.728	0.6333	1.178	8.8	0.015
0.1933	1.722	0.65	1.165	9.	0.015
0.1966	1.715	0.6666	1.15	9.2	0.015
0.2	1.709	0.6833	1.137	9.4	0.015
0.2033	1.702	0.7	1.124	9.6	0.015
0.2066	1.696	0.7166	1.112	9.8	0.015
0.21	1.69	0.7333	1.099	10.	0.012
0.2133	1.684	0.75	1.086	12.	0.015
0.2166	1.677	0.7666	1.074	14.	0.012
0.22	1.671	0.7833	1.061	16.	0.012
0.2233	1.665	0.8	1.049	18.	0.006

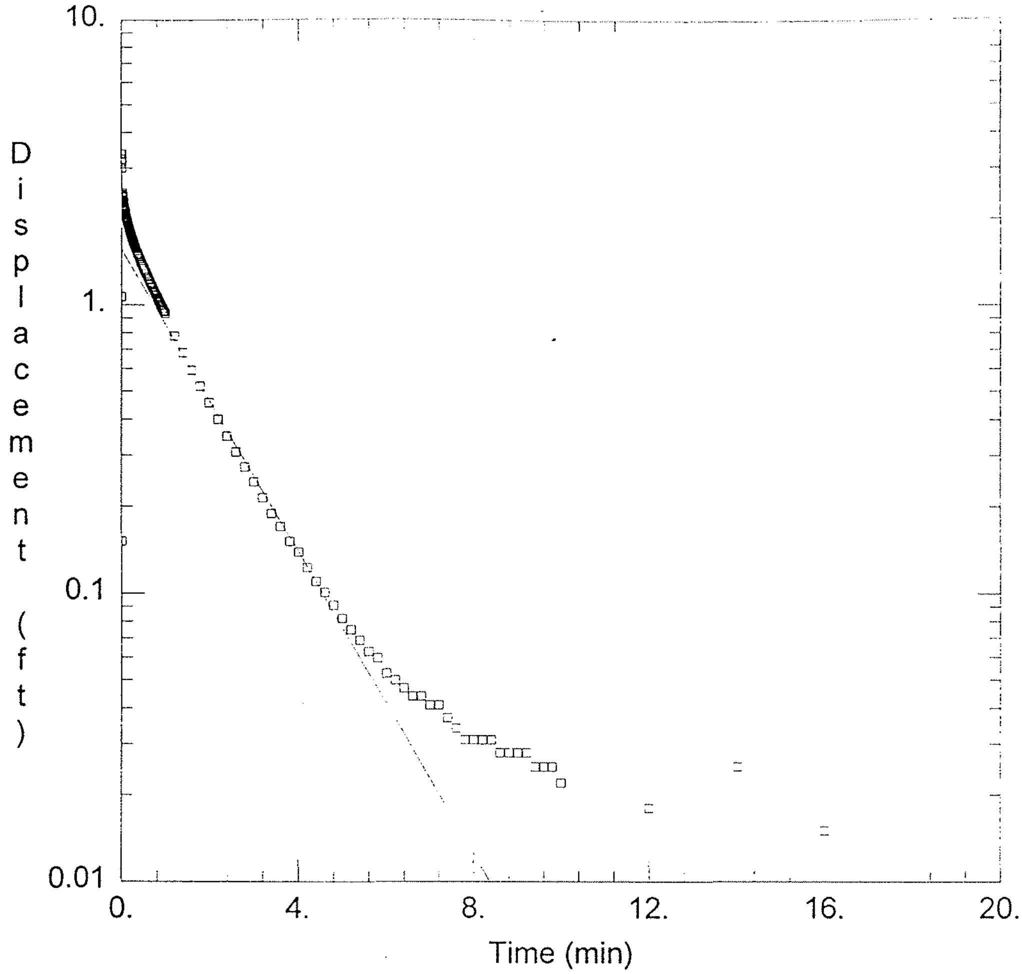
SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0007454	ft/min
y0	1.778	ft



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw39o.aqt
Date: 09/24/99 Time: 10:06:54

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF00320.0013.0016
Test Location: Birmingham, AL
Test Well: MW-39 Slug Out
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 25.89 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-39o)

Initial Displacement: 3.358 ft Water Column Height: 25.89 ft
Casing Radius: 0.08333 ft Wellbore Radius: 0.25 ft
Screen Length: 10. ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw39o.aqt
Date: 09/24/99
Time: 10:07:01

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF00320.0013.0016
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-39 Slug Out

AQUIFER DATA

Saturated Thickness: 25.89 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-39o

X Location: 0. ft
Y Location: 0. ft

No. of observations: 188

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0033	0.151	0.2133	1.766	0.7833	1.09
0.0066	1.064	0.2166	1.759	0.8	1.077
0.01	2.183	0.22	1.753	0.8166	1.061
0.0133	2.998	0.2233	1.744	0.8333	1.052
0.0166	3.162	0.2266	1.737	0.85	1.039
0.02	3.358	0.23	1.731	0.8666	1.026
0.0233	3.225	0.2333	1.725	0.8833	1.014
0.0266	2.451	0.2366	1.718	0.9	1.001
0.03	2.423	0.24	1.712	0.9166	0.992
0.0333	2.407	0.2433	1.709	0.9333	0.979
0.0366	2.382	0.2466	1.699	0.95	0.969
0.04	2.363	0.25	1.693	0.9666	0.957
0.0433	2.341	0.2533	1.69	0.9833	0.947
0.0466	2.319	0.2566	1.684	1.	0.935
0.05	2.303	0.26	1.677	1.2	0.78
0.0533	2.281	0.2633	1.671	1.4	0.682
0.0566	2.262	0.2666	1.665	1.6	0.593
0.06	2.246	0.27	1.661	1.8	0.521

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0633	2.227	0.2733	1.655	2.	0.458
0.0666	2.211	0.2766	1.649	2.2	0.401
0.07	2.198	0.28	1.642	2.4	0.35
0.0733	2.183	0.2833	1.639	2.6	0.309
0.0766	2.167	0.2866	1.633	2.8	0.274
0.08	2.154	0.29	1.627	3.	0.243
0.0833	2.138	0.2933	1.62	3.2	0.214
0.0866	2.129	0.2966	1.617	3.4	0.189
0.09	2.113	0.3	1.611	3.6	0.17
0.0933	2.101	0.3033	1.605	3.8	0.151
0.0966	2.088	0.3066	1.601	4.	0.139
0.1	2.078	0.31	1.595	4.2	0.123
0.1033	2.066	0.3133	1.592	4.4	0.11
0.1066	2.053	0.3166	1.586	4.6	0.101
0.11	2.04	0.32	1.582	4.8	0.091
0.1133	2.031	0.3233	1.576	5.	0.082
0.1166	2.018	0.3266	1.573	5.2	0.075
0.12	2.006	0.33	1.567	5.4	0.069
0.1233	1.996	0.3333	1.563	5.6	0.063
0.1266	1.987	0.35	1.538	5.8	0.06
0.13	1.974	0.3666	1.513	6.	0.053
0.1333	1.965	0.3833	1.491	6.2	0.05
0.1366	1.955	0.4	1.469	6.4	0.047
0.14	1.946	0.4166	1.447	6.6	0.044
0.1433	1.936	0.4333	1.424	6.8	0.044
0.1466	1.927	0.45	1.405	7.	0.041
0.15	1.917	0.4666	1.387	7.2	0.041
0.1533	1.908	0.4833	1.368	7.4	0.037
0.1566	1.898	0.5	1.349	7.6	0.034
0.16	1.889	0.5166	1.33	7.8	0.031
0.1633	1.883	0.5333	1.314	8.	0.031
0.1666	1.873	0.55	1.295	8.2	0.031
0.17	1.864	0.5666	1.279	8.4	0.031
0.1733	1.857	0.5833	1.263	8.6	0.028
0.1766	1.848	0.6	1.248	8.8	0.028
0.18	1.838	0.6166	1.232	9.	0.028
0.1833	1.832	0.6333	1.216	9.2	0.028
0.1866	1.823	0.65	1.2	9.4	0.025
0.19	1.816	0.6666	1.184	9.6	0.025
0.1933	1.81	0.6833	1.172	9.8	0.025
0.1966	1.8	0.7	1.156	10.	0.022
0.2	1.794	0.7166	1.143	12.	0.018
0.2033	1.788	0.7333	1.127	14.	0.025
0.2066	1.778	0.75	1.115	16.	0.015
0.21	1.772	0.7666	1.102		

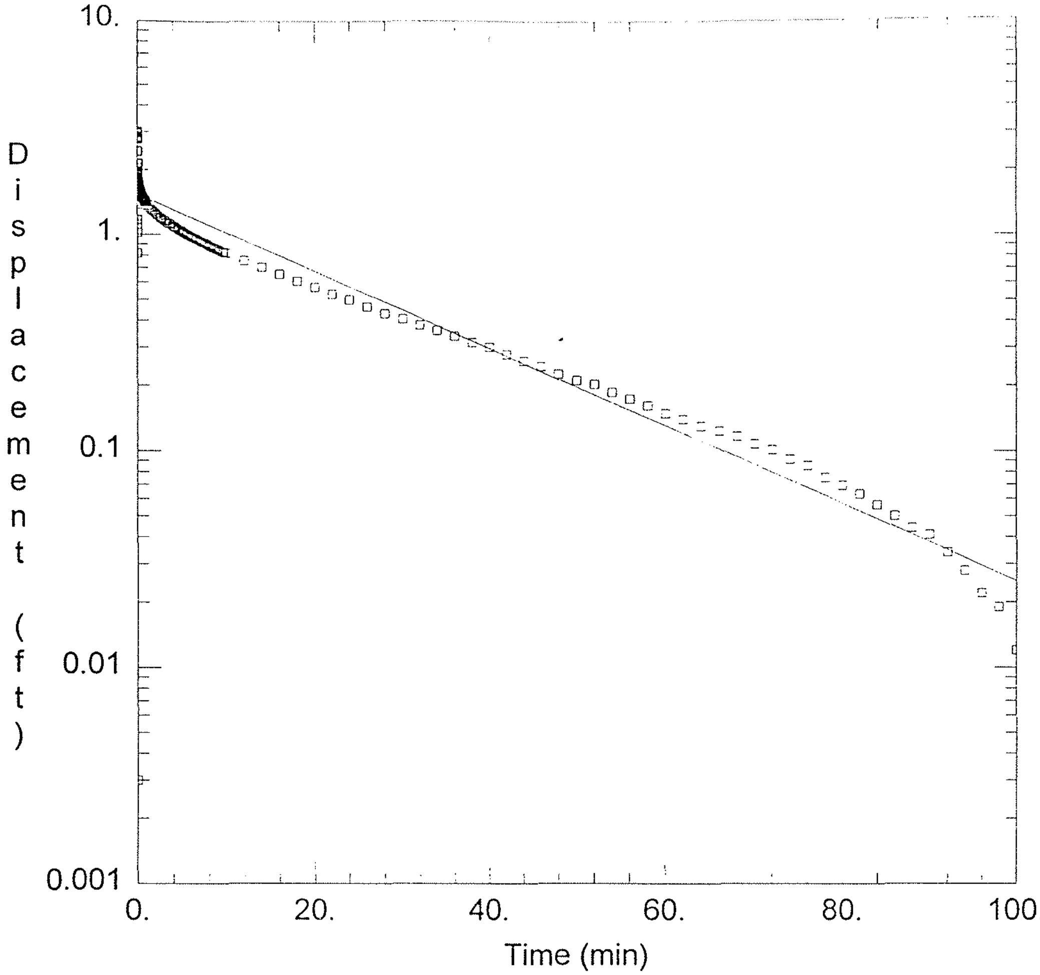
SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0007111	ft/min
y0	1.558	ft



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw40i.aqt
Date: 09/24/99 Time: 10:13:50

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Test Location: Birmingham, AL
Test Well: MW-40 Slug In
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 17.89 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-40i)

Initial Displacement: 3.014 ft Water Column Height: 17.89 ft
Casing Radius: 0.08333 ft Wellbore Radius: 0.25 ft
Screen Length: 10. ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

AQTESOLV for Windows

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw40i.aqt
Date: 09/24/99
Time: 10:13:57

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-40 Slug In

AQUIFER DATA

Saturated Thickness: 17.89 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-40i

X Location: 0. ft
Y Location: 0. ft

No. of observations: 227

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0133	0.003	0.2666	1.699	4.2	1.083
0.0166	0.815	0.27	1.696	4.4	1.071
0.02	1.172	0.2733	1.693	4.6	1.058
0.0233	1.481	0.2766	1.69	4.8	1.045
0.0266	1.017	0.28	1.687	5.	1.036
0.03	1.109	0.2833	1.684	5.2	1.023
0.0333	1.162	0.2866	1.68	5.4	1.011
0.0366	1.412	0.29	1.677	5.6	1.001
0.04	1.636	0.2933	1.674	5.8	0.992
0.0433	1.56	0.2966	1.671	6.	0.982
0.0466	1.576	0.3	1.668	6.2	0.973
0.05	1.595	0.3033	1.665	6.4	0.963
0.0533	1.955	0.3066	1.665	6.6	0.954
0.0566	2.451	0.31	1.661	6.8	0.944
0.06	2.792	0.3133	1.658	7.	0.935
0.0633	2.979	0.3166	1.655	7.2	0.925
0.0666	3.014	0.32	1.655	7.4	0.919
0.07	2.95	0.3233	1.649	7.6	0.913

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0733	2.849	0.3266	1.649	7.8	0.903
0.0766	2.799	0.33	1.646	8.	0.894
0.08	2.812	0.3333	1.642	8.2	0.884
0.0833	2.764	0.35	1.63	8.4	0.878
0.0866	2.426	0.3666	1.617	8.6	0.872
0.09	1.826	0.3833	1.605	8.8	0.862
0.0933	1.374	0.4	1.595	9.	0.856
0.0966	1.415	0.4166	1.586	9.2	0.849
0.1	1.503	0.4333	1.576	9.4	0.84
0.1033	1.819	0.45	1.567	9.6	0.834
0.1066	1.977	0.4666	1.56	9.8	0.827
0.11	2.132	0.4833	1.551	10.	0.821
0.1133	2.135	0.5	1.545	12.	0.758
0.1166	2.034	0.5166	1.538	14.	0.704
0.12	1.911	0.5333	1.532	16.	0.654
0.1233	1.804	0.55	1.522	18.	0.606
0.1266	1.763	0.5666	1.519	20.	0.568
0.13	1.778	0.5833	1.51	22.	0.53
0.1333	1.832	0.6	1.507	24.	0.499
0.1366	1.889	0.6166	1.5	26.	0.464
0.14	1.921	0.6333	1.494	28.	0.432
0.1433	1.917	0.65	1.491	30.	0.407
0.1466	1.883	0.6666	1.485	32.	0.382
0.15	1.842	0.6833	1.481	34.	0.36
0.1533	1.807	0.7	1.475	36.	0.338
0.1566	1.794	0.7166	1.472	38.	0.316
0.16	1.797	0.7333	1.466	40.	0.3
0.1633	1.813	0.75	1.462	42.	0.278
0.1666	1.829	0.7666	1.456	44.	0.259
0.17	1.832	0.7833	1.453	46.	0.246
0.1733	1.826	0.8	1.45	48.	0.227
0.1766	1.81	0.8166	1.447	50.	0.211
0.18	1.794	0.8333	1.44	52.	0.202
0.1833	1.782	0.85	1.437	54.	0.186
0.1866	1.775	0.8666	1.434	56.	0.173
0.19	1.775	0.8833	1.431	58.	0.161
0.1933	1.778	0.9	1.428	60.	0.148
0.1966	1.778	0.9166	1.424	62.	0.139
0.2	1.775	0.9333	1.421	64.	0.129
0.2033	1.772	0.95	1.415	66.	0.123
0.2066	1.766	0.9666	1.412	68.	0.116
0.21	1.759	0.9833	1.412	70.	0.107
0.2133	1.753	1.	1.409	72.	0.101
0.2166	1.747	1.2	1.361	74.	0.091
0.22	1.744	1.4	1.33	76.	0.085
0.2233	1.74	1.6	1.301	78.	0.075
0.2266	1.74	1.8	1.279	80.	0.069
0.23	1.737	2.	1.257	82.	0.063

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.2333	1.734	2.2	1.238	84.	0.056
0.2366	1.728	2.4	1.216	86.	0.05
0.24	1.725	2.6	1.197	88.	0.044
0.2433	1.721	2.8	1.181	90.	0.041
0.2466	1.718	3.	1.165	92.	0.034
0.25	1.712	3.2	1.153	94.	0.028
0.2533	1.712	3.4	1.134	96.	0.022
0.2566	1.709	3.6	1.124	98.	0.019
0.26	1.706	3.8	1.112	100.	0.012
0.2633	1.703	4.	1.096		

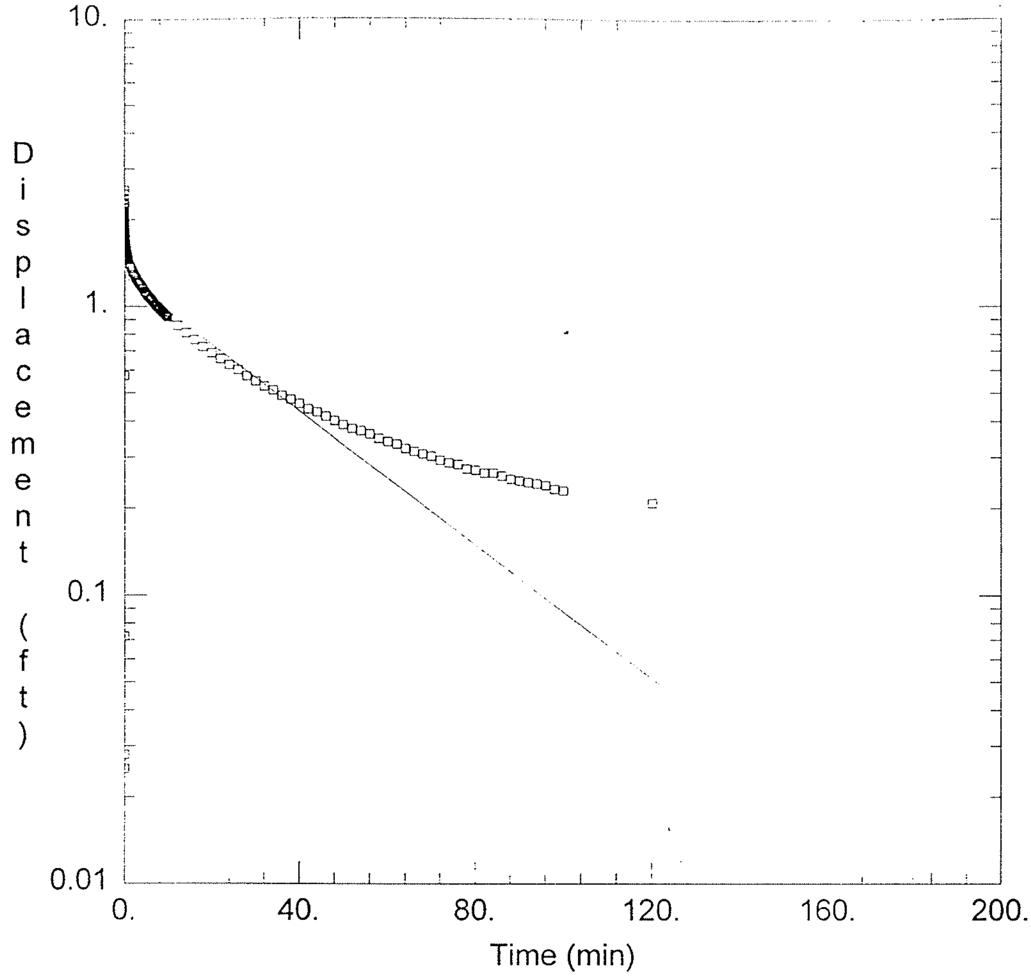
SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	4.537E-05	ft/min
y0	1.538	ft



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw40o.aqt
Date: 09/24/99 Time: 10:18:17

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Test Location: Birmingham, AL
Test Well: MW-40 Slug Out
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 17.89 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-40o)

Initial Displacement: 2.527 ft
Casing Radius: 0.08333 ft
Screen Length: 10. ft
Water Column Height: 17.89 ft
Wellbore Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw40o.aqt
Date: 09/24/99
Time: 10:18:23

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-40 Slug Out

AQUIFER DATA

Saturated Thickness: 17.89 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-40o

X Location: 0. ft
Y Location: 0. ft

No. of observations: 231

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0033	0.028	0.26	1.759	4.	1.165
0.0066	0.028	0.2633	1.756	4.2	1.153
0.01	0.028	0.2666	1.753	4.4	1.143
0.0133	0.025	0.27	1.75	4.6	1.127
0.0166	0.025	0.2733	1.747	4.8	1.118
0.02	0.072	0.2766	1.743	5.	1.105
0.0233	0.574	0.28	1.74	5.2	1.096
0.0266	1.32	0.2833	1.734	5.4	1.086
0.03	2.047	0.2866	1.731	5.6	1.08
0.0333	2.337	0.29	1.728	5.8	1.071
0.0366	2.258	0.2933	1.725	6.	1.061
0.04	2.085	0.2966	1.725	6.2	1.052
0.0433	2.075	0.3	1.721	6.4	1.045
0.0466	2.195	0.3033	1.718	6.6	1.036
0.05	2.448	0.3066	1.712	6.8	1.026
0.0533	2.527	0.31	1.709	7.	1.017
0.0566	2.353	0.3133	1.706	7.2	1.01
0.06	2.129	0.3166	1.702	7.4	1.004

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0633	2.006	0.32	1.702	7.6	0.998
0.0666	2.05	0.3233	1.699	7.8	0.992
0.07	2.179	0.3266	1.696	8.	0.982
0.0733	2.262	0.33	1.693	8.2	0.976
0.0766	2.24	0.3333	1.69	8.4	0.969
0.08	2.145	0.35	1.677	8.6	0.96
0.0833	2.059	0.3666	1.661	8.8	0.957
0.0866	2.037	0.3833	1.649	9.	0.95
0.09	2.072	0.4	1.639	9.2	0.941
0.0933	2.113	0.4166	1.627	9.4	0.935
0.0966	2.126	0.4333	1.617	9.6	0.928
0.1	2.091	0.45	1.608	9.8	0.922
0.1033	2.044	0.4666	1.598	10.	0.916
0.1066	2.015	0.4833	1.589	12.	0.859
0.11	2.012	0.5	1.582	14.	0.811
0.1133	2.025	0.5166	1.573	16.	0.767
0.1166	2.031	0.5333	1.567	18.	0.726
0.12	2.022	0.55	1.557	20.	0.691
0.1233	1.999	0.5666	1.551	22.	0.66
0.1266	1.98	0.5833	1.544	24.	0.628
0.13	1.971	0.6	1.541	26.	0.603
0.1333	1.968	0.6166	1.535	28.	0.574
0.1366	1.968	0.6333	1.529	30.	0.552
0.14	1.965	0.65	1.522	32.	0.53
0.1433	1.955	0.6666	1.516	34.	0.514
0.1466	1.943	0.6833	1.513	36.	0.492
0.15	1.93	0.7	1.507	38.	0.477
0.1533	1.924	0.7166	1.503	40.	0.461
0.1566	1.92	0.7333	1.497	42.	0.442
0.16	1.917	0.75	1.494	44.	0.432
0.1633	1.905	0.7666	1.491	46.	0.417
0.1666	1.895	0.7833	1.488	48.	0.404
0.17	1.895	0.8	1.481	50.	0.391
0.1733	1.889	0.8166	1.478	52.	0.379
0.1766	1.886	0.8333	1.475	54.	0.372
0.18	1.876	0.85	1.472	56.	0.363
0.1833	1.867	0.8666	1.465	58.	0.35
0.1866	1.86	0.8833	1.462	60.	0.341
0.19	1.854	0.9	1.459	62.	0.334
0.1933	1.851	0.9166	1.456	64.	0.322
0.1966	1.848	0.9333	1.453	66.	0.315
0.2	1.845	0.95	1.45	68.	0.309
0.2033	1.835	0.9666	1.446	70.	0.303
0.2066	1.829	0.9833	1.443	72.	0.293
0.21	1.822	1.	1.44	74.	0.287
0.2133	1.819	1.2	1.396	76.	0.284
0.2166	1.816	1.4	1.371	78.	0.274
0.22	1.813	1.6	1.349	80.	0.271

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.2233	1.807	1.8	1.326	82.	0.265
0.2266	1.804	2.	1.307	84.	0.265
0.23	1.797	2.2	1.289	86.	0.259
0.2333	1.794	2.4	1.273	88.	0.252
0.2366	1.788	2.6	1.257	90.	0.249
0.24	1.785	2.8	1.244	92.	0.246
0.2433	1.781	3.	1.229	94.	0.243
0.2466	1.775	3.2	1.213	96.	0.24
0.25	1.772	3.4	1.2	98.	0.233
0.2533	1.766	3.6	1.187	100.	0.23
0.2566	1.762	3.8	1.175	120.	0.208

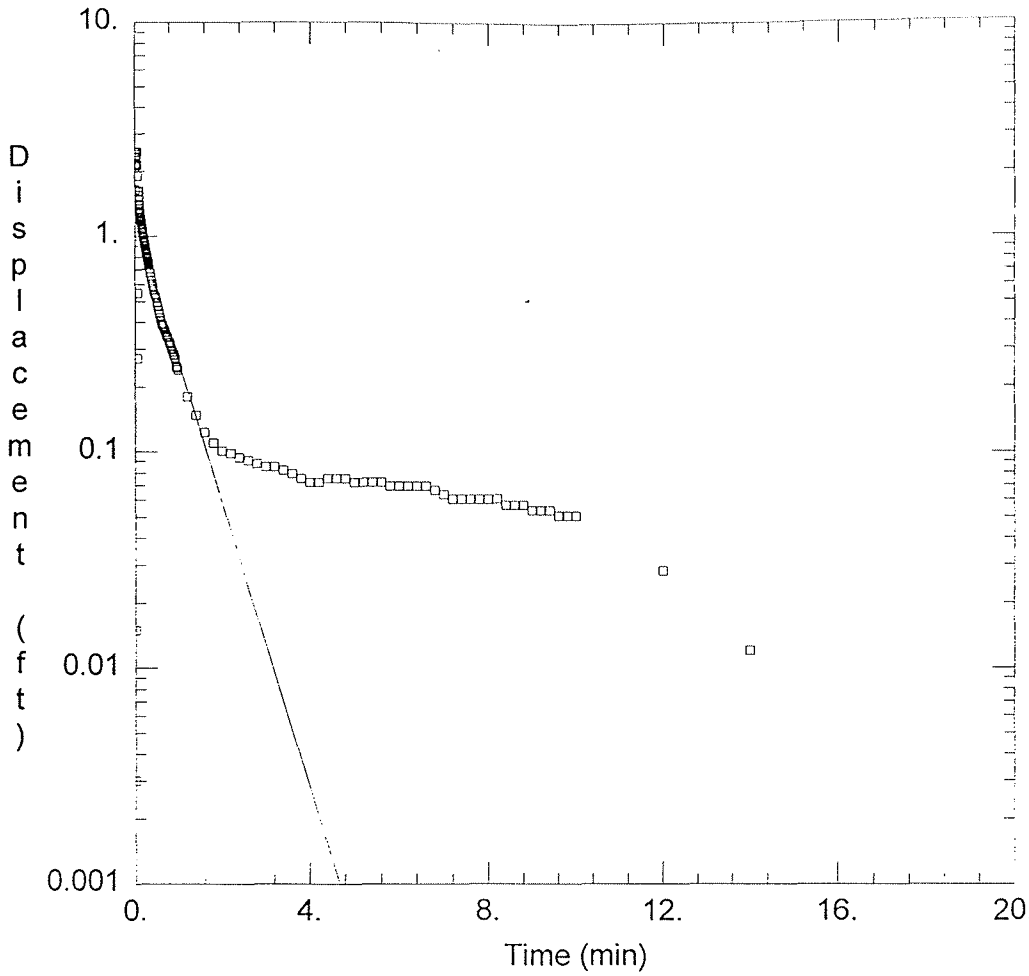
SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	2.942E-05	ft/min
y0	1.264	ft



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw41i.aqt
Date: 09/24/99 Time: 10:23:30

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Test Location: Birmingham, AL
Test Well: MW-41 Slug In
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 8.62 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-41i)

Initial Displacement: 2.473 ft Water Column Height: 8.62 ft
Casing Radius: 0.1105 ft Wellbore Radius: 0.25 ft
Screen Length: 10. ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw41i.aqt
Date: 09/24/99
Time: 10:23:36

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-41 Slug In

AQUIFER DATA

Saturated Thickness: 8.62 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-41i

X Location: 0. ft
Y Location: 0. ft

No. of observations: 186

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0066	0.015	0.2133	0.985	0.7666	0.338
0.01	0.003	0.2166	0.976	0.7833	0.331
0.0133	1.652	0.22	0.966	0.8	0.322
0.0166	2.18	0.2233	0.96	0.8166	0.319
0.02	2.091	0.2266	0.951	0.8333	0.312
0.0233	1.004	0.23	0.941	0.85	0.303
0.0266	1.203	0.2333	0.932	0.8666	0.297
0.03	2.154	0.2366	0.925	0.8833	0.29
0.0333	2.315	0.24	0.919	0.9	0.284
0.0366	2.347	0.2433	0.91	0.9166	0.281
0.04	2.341	0.2466	0.903	0.9333	0.274
0.0433	2.331	0.25	0.894	0.95	0.268
0.0466	2.135	0.2533	0.884	0.9666	0.249
0.05	2.41	0.2566	0.878	0.9833	0.246
0.0533	2.464	0.26	0.872	1.	0.24
0.0566	2.473	0.2633	0.865	1.2	0.18
0.06	2.473	0.2666	0.859	1.4	0.148
0.0633	0.271	0.27	0.849	1.6	0.123

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0666	0.546	0.2733	0.843	1.8	0.11
0.07	1.295	0.2766	0.837	2.	0.101
0.0733	1.911	0.28	0.831	2.2	0.098
0.0766	2.148	0.2833	0.824	2.4	0.094
0.08	1.633	0.2866	0.818	2.6	0.091
0.0833	1.216	0.29	0.812	2.8	0.088
0.0866	1.222	0.2933	0.805	3.	0.085
0.09	1.469	0.2966	0.796	3.2	0.085
0.0933	1.614	0.3	0.793	3.4	0.082
0.0966	1.551	0.3033	0.786	3.6	0.079
0.1	1.402	0.3066	0.783	3.8	0.075
0.1033	1.317	0.31	0.777	4.	0.072
0.1066	1.339	0.3133	0.77	4.2	0.072
0.11	1.387	0.3166	0.764	4.4	0.075
0.1133	1.393	0.32	0.758	4.6	0.075
0.1166	1.352	0.3233	0.755	4.8	0.075
0.12	1.308	0.3266	0.748	5.	0.072
0.1233	1.286	0.33	0.739	5.2	0.072
0.1266	1.286	0.3333	0.733	5.4	0.072
0.13	1.286	0.35	0.704	5.6	0.072
0.1333	1.27	0.3666	0.676	5.8	0.069
0.1366	1.248	0.3833	0.65	6.	0.069
0.14	1.229	0.4	0.625	6.2	0.069
0.1433	1.216	0.4166	0.603	6.4	0.069
0.1466	1.206	0.4333	0.584	6.6	0.069
0.15	1.194	0.45	0.562	6.8	0.066
0.1533	1.181	0.4666	0.54	7.	0.063
0.1566	1.169	0.4833	0.53	7.2	0.06
0.16	1.153	0.5	0.521	7.4	0.06
0.1633	1.143	0.5166	0.492	7.6	0.06
0.1666	1.131	0.5333	0.473	7.8	0.06
0.17	1.118	0.55	0.455	8.	0.06
0.1733	1.109	0.5666	0.439	8.2	0.06
0.1766	1.096	0.5833	0.42	8.4	0.056
0.18	1.086	0.6	0.407	8.6	0.056
0.1833	1.074	0.6166	0.395	8.8	0.056
0.1866	1.064	0.6333	0.391	9.	0.053
0.19	1.055	0.65	0.385	9.2	0.053
0.1933	1.042	0.6666	0.379	9.4	0.053
0.1966	1.033	0.6833	0.372	9.6	0.05
0.2	1.023	0.7	0.366	9.8	0.05
0.2033	1.014	0.7166	0.36	10.	0.05
0.2066	1.004	0.7333	0.35	12.	0.028
0.21	0.992	0.75	0.344	14.	0.012

SOLUTION

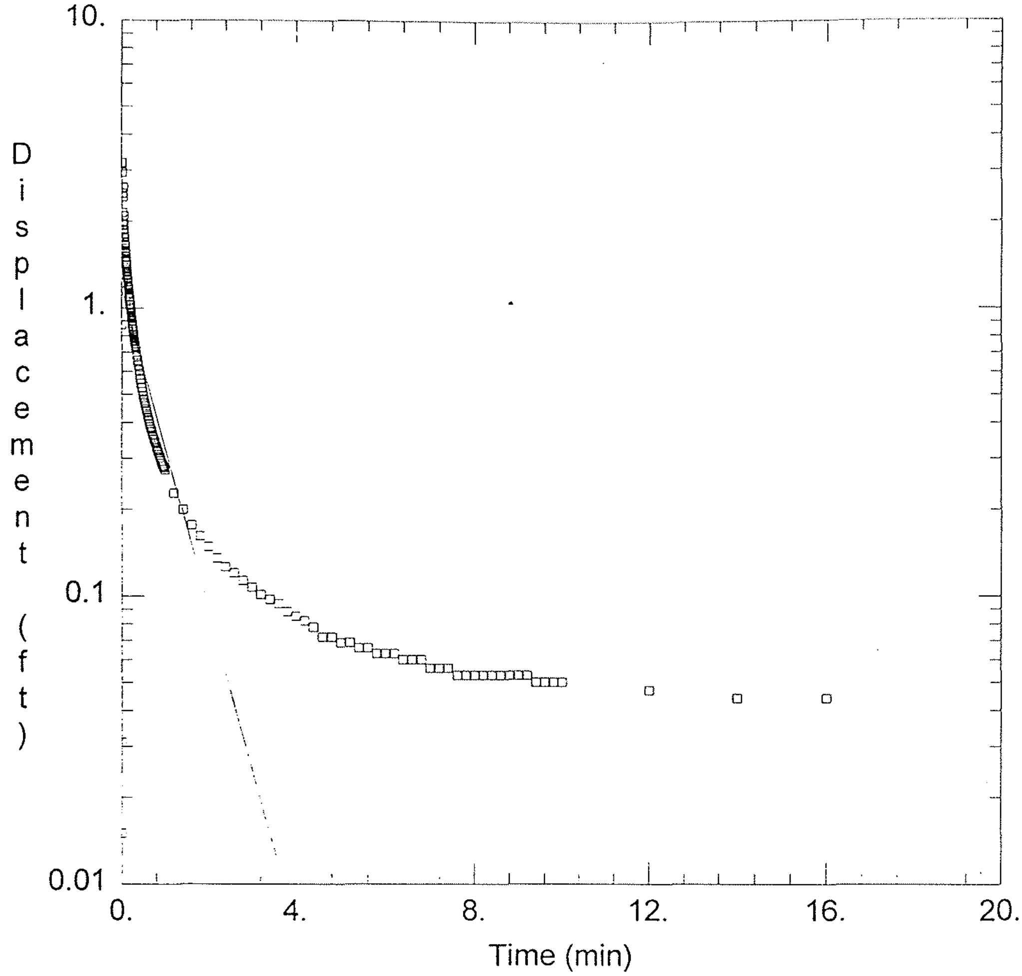
Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.002518	ft/min
y0	1.223	ft



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw41o.aqt
Date: 09/24/99 Time: 10:26:31

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Test Location: Birmingham, AL
Test Well: MW-41 Slug Out
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 8.62 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-41o)

Initial Displacement: 3.181 ft Water Column Height: 8.62 ft
Casing Radius: 0.1105 ft Wellbore Radius: 0.25 ft
Screen Length: 10. ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw41o.aqt
Date: 09/24/99
Time: 10:26:37

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-41 Slug Out

AQUIFER DATA

Saturated Thickness: 8.62 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-41o

X Location: 0. ft
Y Location: 0. ft

No. of observations: 187

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0033	0.031	0.2166	0.995	0.8	0.331
0.01	0.015	0.22	0.985	0.8166	0.325
0.0133	0.875	0.2233	0.976	0.8333	0.319
0.0166	2.138	0.2266	0.963	0.85	0.315
0.02	2.499	0.23	0.957	0.8666	0.309
0.0233	3.181	0.2333	0.944	0.8833	0.303
0.0266	2.95	0.2366	0.935	0.9	0.3
0.03	1.219	0.24	0.925	0.9166	0.293
0.0333	1.939	0.2433	0.916	0.9333	0.287
0.0366	2.426	0.2466	0.906	0.95	0.284
0.04	1.971	0.25	0.9	0.9666	0.281
0.0433	2.612	0.2533	0.887	0.9833	0.278
0.0466	1.943	0.2566	0.881	1.	0.274
0.05	1.87	0.26	0.872	1.2	0.227
0.0533	2.082	0.2633	0.862	1.4	0.199
0.0566	1.87	0.2666	0.856	1.6	0.176
0.06	1.807	0.27	0.846	1.8	0.161
0.0633	1.86	0.2733	0.84	2.	0.148

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0666	1.804	0.2766	0.83	2.2	0.135
0.07	1.75	0.28	0.824	2.4	0.126
0.0733	1.762	0.2833	0.815	2.6	0.12
0.0766	1.718	0.2866	0.808	2.8	0.113
0.08	1.68	0.29	0.802	3.	0.107
0.0833	1.661	0.2933	0.793	3.2	0.101
0.0866	1.639	0.2966	0.786	3.4	0.097
0.09	1.608	0.3	0.78	3.6	0.094
0.0933	1.582	0.3033	0.774	3.8	0.088
0.0966	1.557	0.3066	0.767	4.	0.085
0.1	1.538	0.31	0.761	4.2	0.082
0.1033	1.513	0.3133	0.751	4.4	0.078
0.1066	1.5	0.3166	0.748	4.6	0.072
0.11	1.475	0.32	0.739	4.8	0.072
0.1133	1.456	0.3233	0.732	5.	0.069
0.1166	1.437	0.3266	0.729	5.2	0.069
0.12	1.415	0.33	0.723	5.4	0.066
0.1233	1.399	0.3333	0.717	5.6	0.066
0.1266	1.38	0.35	0.685	5.8	0.063
0.13	1.361	0.3666	0.657	6.	0.063
0.1333	1.342	0.3833	0.631	6.2	0.063
0.1366	1.326	0.4	0.606	6.4	0.06
0.14	1.308	0.4166	0.584	6.6	0.06
0.1433	1.292	0.4333	0.565	6.8	0.06
0.1466	1.276	0.45	0.546	7.	0.056
0.15	1.26	0.4666	0.527	7.2	0.056
0.1533	1.244	0.4833	0.511	7.4	0.056
0.1566	1.229	0.5	0.496	7.6	0.053
0.16	1.213	0.5166	0.483	7.8	0.053
0.1633	1.197	0.5333	0.47	8.	0.053
0.1666	1.184	0.55	0.458	8.2	0.053
0.17	1.172	0.5666	0.445	8.4	0.053
0.1733	1.156	0.5833	0.436	8.6	0.053
0.1766	1.137	0.6	0.423	8.8	0.053
0.18	1.127	0.6166	0.413	9.	0.053
0.1833	1.115	0.6333	0.404	9.2	0.053
0.1866	1.102	0.65	0.394	9.4	0.05
0.19	1.09	0.6666	0.385	9.6	0.05
0.1933	1.077	0.6833	0.379	9.8	0.05
0.1966	1.064	0.7	0.372	10.	0.05
0.2	1.055	0.7166	0.363	12.	0.047
0.2033	1.042	0.7333	0.357	14.	0.044
0.2066	1.029	0.75	0.35	16.	0.044
0.21	1.02	0.7666	0.344		
0.2133	1.007	0.7833	0.338		

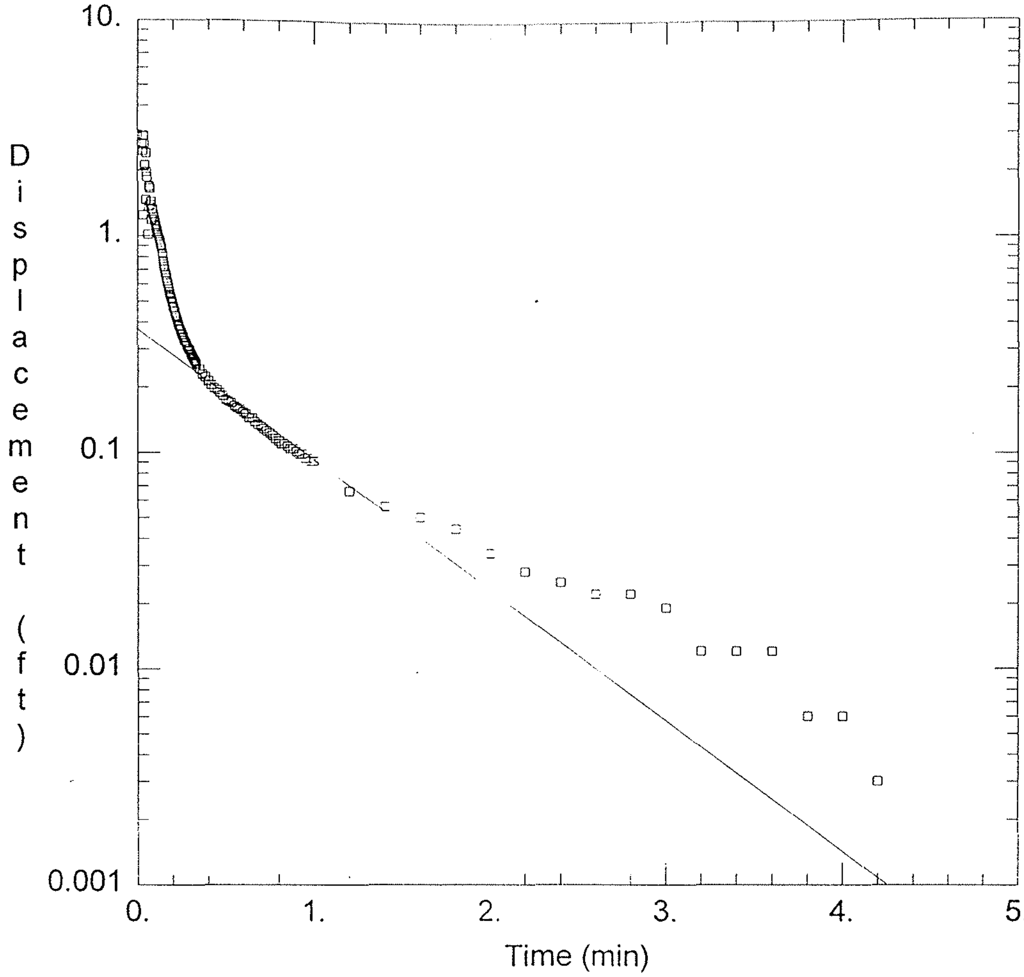
SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.002119	ft/min
y0	1.166	ft



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw42i.aqt
Date: 09/24/99 Time: 11:41:31

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Test Location: Birmingham, AL
Test Well: MW-42i
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 7.82 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-42i)

Initial Displacement: 2.931 ft
Casing Radius: 0.1105 ft
Screen Length: 10. ft
Water Column Height: 7.82 ft
Wellbore Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

AQTESOLV for Windows

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw42i.aqt
Date: 09/24/99
Time: 11:41:40

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-42i

AQUIFER DATA

Saturated Thickness: 7.82 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-42i

X Location: 0. ft
Y Location: 0. ft

No. of observations: 149

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0266	2.653	0.1933	0.515	0.4666	0.189
0.03	1.244	0.1966	0.502	0.4833	0.183
0.0333	2.473	0.2	0.492	0.5	0.176
0.0366	2.913	0.2033	0.477	0.5166	0.173
0.04	2.644	0.2066	0.467	0.5333	0.17
0.0433	2.123	0.21	0.458	0.55	0.164
0.0466	1.466	0.2133	0.448	0.5666	0.161
0.05	2.413	0.2166	0.436	0.5833	0.158
0.0533	1.974	0.22	0.429	0.6	0.154
0.0566	1.873	0.2233	0.42	0.6166	0.151
0.06	1.017	0.2266	0.41	0.6333	0.145
0.0633	1.368	0.23	0.404	0.65	0.145
0.0666	1.696	0.2333	0.394	0.6666	0.139
0.07	1.658	0.2366	0.388	0.6833	0.135
0.0733	1.396	0.24	0.382	0.7	0.132
0.0766	1.44	0.2433	0.372	0.7166	0.129
0.08	1.188	0.2466	0.366	0.7333	0.126
0.0833	1.336	0.25	0.36	0.75	0.123

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0866	1.33	0.2533	0.353	0.7666	0.12
0.09	1.26	0.2566	0.35	0.7833	0.116
0.0933	1.219	0.26	0.344	0.8	0.113
0.0966	1.191	0.2633	0.338	0.8166	0.11
0.1	1.165	0.2666	0.331	0.8333	0.11
0.1033	1.134	0.27	0.328	0.85	0.107
0.1066	1.105	0.2733	0.322	0.8666	0.104
0.11	1.077	0.2766	0.319	0.8833	0.104
0.1133	1.052	0.28	0.312	0.9	0.101
0.1166	1.026	0.2833	0.309	0.9166	0.098
0.12	1.001	0.2866	0.303	0.9333	0.098
0.1233	0.979	0.29	0.3	0.95	0.094
0.1266	0.957	0.2933	0.297	0.9666	0.094
0.13	0.935	0.2966	0.293	0.9833	0.091
0.1333	0.913	0.3	0.287	1.	0.091
0.1366	0.894	0.3033	0.284	1.2	0.066
0.14	0.878	0.3066	0.281	1.4	0.056
0.1433	0.827	0.31	0.278	1.6	0.05
0.1466	0.767	0.3133	0.274	1.8	0.044
0.15	0.739	0.3166	0.271	2.	0.034
0.1533	0.723	0.32	0.268	2.2	0.028
0.1566	0.701	0.3233	0.265	2.4	0.025
0.16	0.676	0.3266	0.262	2.6	0.022
0.1633	0.663	0.33	0.259	2.8	0.022
0.1666	0.641	0.3333	0.255	3.	0.019
0.17	0.622	0.35	0.243	3.2	0.012
0.1733	0.606	0.3666	0.23	3.4	0.012
0.1766	0.587	0.3833	0.224	3.6	0.012
0.18	0.571	0.4	0.214	3.8	0.006
0.1833	0.552	0.4166	0.205	4.	0.006
0.1866	0.54	0.4333	0.199	4.2	0.003
0.19	0.53	0.45	0.195		

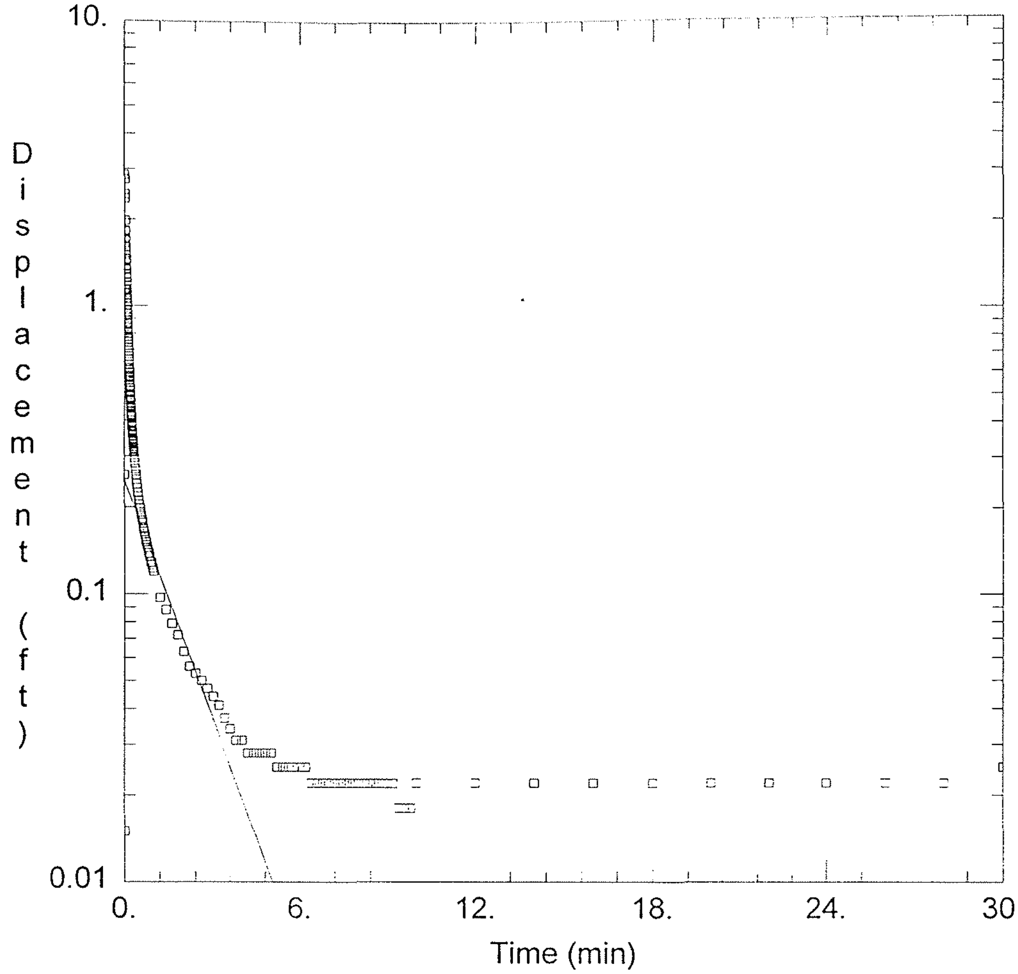
SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.002254	ft/min
y0	0.3724	ft



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw42o.aqt
Date: 09/24/99 Time: 11:37:35

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Test Location: Birmingham, AL
Test Well: MW-42 Slug Out
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 7.82 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-42o)

Initial Displacement: 2.859 ft
Casing Radius: 0.1105 ft
Screen Length: 10. ft
Water Column Height: 7.82 ft
Wellbore Radius: 0.25 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

AQTESOLV for Windows

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw42o.aqt
Date: 09/24/99
Time: 11:37:23

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-42 Slug Out

AQUIFER DATA

Saturated Thickness: 7.82 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-42o

X Location: 0. ft
Y Location: 0. ft

No. of observations: 195

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0033	0.015	0.22	0.467	0.85	0.135
0.0066	0.259	0.2233	0.458	0.8666	0.135
0.01	2.859	0.2266	0.451	0.8833	0.129
0.0133	2.761	0.23	0.445	0.9	0.129
0.0166	2.445	0.2333	0.439	0.9166	0.129
0.02	2.366	0.2366	0.432	0.9333	0.126
0.0233	1.131	0.24	0.426	0.95	0.123
0.0266	1.822	0.2433	0.42	0.9666	0.123
0.03	1.98	0.2466	0.413	0.9833	0.12
0.0333	1.81	0.25	0.41	1.	0.12
0.0366	1.715	0.2533	0.404	1.2	0.097
0.04	1.674	0.2566	0.398	1.4	0.088
0.0433	1.623	0.26	0.391	1.6	0.079
0.0466	1.589	0.2633	0.388	1.8	0.072
0.05	1.544	0.2666	0.382	2.	0.063
0.0533	1.497	0.27	0.379	2.2	0.056
0.0566	1.453	0.2733	0.372	2.4	0.053
0.06	1.421	0.2766	0.369	2.6	0.05

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0633	1.443	0.28	0.366	2.8	0.047
0.0666	1.345	0.2833	0.36	3.	0.044
0.07	1.289	0.2866	0.357	3.2	0.041
0.0733	1.279	0.29	0.353	3.4	0.037
0.0766	1.244	0.2933	0.347	3.6	0.034
0.08	1.206	0.2966	0.344	3.8	0.031
0.0833	1.172	0.3	0.341	4.	0.031
0.0866	1.14	0.3033	0.338	4.2	0.028
0.09	1.108	0.3066	0.334	4.4	0.028
0.0933	1.08	0.31	0.331	4.6	0.028
0.0966	1.052	0.3133	0.328	4.8	0.028
0.1	1.023	0.3166	0.325	5.	0.028
0.1033	0.995	0.32	0.322	5.2	0.025
0.1066	0.966	0.3233	0.319	5.4	0.025
0.11	0.941	0.3266	0.315	5.6	0.025
0.1133	0.916	0.33	0.312	5.8	0.025
0.1166	0.89	0.3333	0.309	6.	0.025
0.12	0.865	0.35	0.296	6.2	0.025
0.1233	0.843	0.3666	0.284	6.4	0.022
0.1266	0.821	0.3833	0.271	6.6	0.022
0.13	0.802	0.4	0.259	6.8	0.022
0.1333	0.78	0.4166	0.249	7.	0.022
0.1366	0.761	0.4333	0.24	7.2	0.022
0.14	0.745	0.45	0.233	7.4	0.022
0.1433	0.726	0.4666	0.224	7.6	0.022
0.1466	0.71	0.4833	0.218	7.8	0.022
0.15	0.695	0.5	0.211	8.	0.022
0.1533	0.679	0.5166	0.205	8.2	0.022
0.1566	0.663	0.5333	0.199	8.4	0.022
0.16	0.647	0.55	0.192	8.6	0.022
0.1633	0.635	0.5666	0.189	8.8	0.022
0.1666	0.622	0.5833	0.183	9.	0.022
0.17	0.606	0.6	0.18	9.2	0.022
0.1733	0.597	0.6166	0.176	9.4	0.018
0.1766	0.584	0.6333	0.17	9.6	0.018
0.18	0.571	0.65	0.167	9.8	0.018
0.1833	0.562	0.6666	0.164	10.	0.022
0.1866	0.552	0.6833	0.161	12.	0.022
0.19	0.54	0.7	0.158	14.	0.022
0.1933	0.53	0.7166	0.154	16.	0.022
0.1966	0.524	0.7333	0.151	18.	0.022
0.2	0.514	0.75	0.151	20.	0.022
0.2033	0.505	0.7666	0.148	22.	0.022
0.2066	0.496	0.7833	0.145	24.	0.022
0.21	0.489	0.8	0.142	26.	0.022
0.2133	0.48	0.8166	0.139	28.	0.022
0.2166	0.473	0.8333	0.139	30.	0.025

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.00103	ft/min
y0	0.2477	ft

SE1000C
Environmental Logger
08/31 16:32

Unit# 00568 Test 4

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00043
Reference	0.000
Linearity	0.000
Scale factor	10.000
Offset	0.020
Delay mSEC	50.000

Step 0 06/23 13:29:06

Elapsed Time	INPUT 1
0.0000	-3.162
0.0033	-3.162
0.0066	-3.162
0.0100	-3.159
0.0133	-3.159
0.0166	-3.168
0.0200	-3.159
0.0233	-3.159
0.0266	-3.323
0.0300	-4.884
0.0333	-4.928
0.0366	-5.804
0.0400	-5.785
0.0433	-5.810
0.0466	-5.829
0.0500	-5.844
0.0533	-5.993
0.0566	-4.802
0.0600	-5.298
0.0633	-5.178
0.0666	-5.102
0.0700	-5.462
0.0733	-4.698
0.0766	-5.089

0.0800	-5.149
0.0833	-5.089
0.0866	-5.067
0.0900	-5.055
0.0933	-5.026
0.0966	-5.010
0.1000	-4.988
0.1033	-4.957
0.1066	-4.938
0.1100	-4.941
0.1133	-4.916
0.1166	-4.897
0.1200	-4.881
0.1233	-4.862
0.1266	-4.843
0.1300	-4.827
0.1333	-4.818
0.1366	-4.802
0.1400	-4.780
0.1433	-4.770
0.1466	-4.758
0.1500	-4.742
0.1533	-4.726
0.1566	-4.710
0.1600	-4.691
0.1633	-4.676
0.1666	-4.663
0.1700	-4.647
0.1733	-4.635
0.1766	-4.622
0.1800	-4.609
0.1833	-4.590
0.1866	-4.575
0.1900	-4.565
0.1933	-4.552
0.1966	-4.540
0.2000	-4.524
0.2033	-4.511
0.2066	-4.499
0.2100	-4.483
0.2133	-4.470
0.2166	-4.458
0.2200	-4.442
0.2233	-4.429
0.2266	-4.417
0.2300	-4.404
0.2333	-4.391

0.2366	-4.379
0.2400	-4.363
0.2433	-4.353
0.2466	-4.341
0.2500	-4.331
0.2533	-4.315
0.2566	-4.303
0.2600	-4.290
0.2633	-4.278
0.2666	-4.268
0.2700	-4.255
0.2733	-4.240
0.2766	-4.233
0.2800	-4.217
0.2833	-4.208
0.2866	-4.199
0.2900	-4.186
0.2933	-4.173
0.2966	-4.164
0.3000	-4.154
0.3033	-4.142
0.3066	-4.123
0.3100	-4.094
0.3133	-4.063
0.3166	-4.034
0.3200	-4.009
0.3233	-3.987
0.3266	-3.974
0.3300	-3.958
0.3333	-3.943
0.3500	-3.867
0.3666	-3.804
0.3833	-3.740
0.4000	-3.687
0.4166	-3.639
0.4333	-3.592
0.4500	-3.551
0.4666	-3.519
0.4833	-3.484
0.5000	-3.453
0.5166	-3.428
0.5333	-3.405
0.5500	-3.383
0.5666	-3.364
0.5833	-3.346
0.6000	-3.330
0.6166	-3.314

0.6333	-3.301
0.6500	-3.289
0.6666	-3.279
0.6833	-3.270
0.7000	-3.260
0.7166	-3.251
0.7333	-3.244
0.7500	-3.238
0.7666	-3.232
0.7833	-3.229
0.8000	-3.222
0.8166	-3.219
0.8333	-3.216
0.8500	-3.210
0.8666	-3.206
0.8833	-3.203
0.9000	-3.203
0.9166	-3.200
0.9333	-3.197
0.9500	-3.194
0.9666	-3.191
0.9833	-3.191
1.0000	-3.191
1.2000	-3.172
1.4000	-3.168
1.6000	-3.162
1.8000	-3.159
2.0000	-3.156
2.2000	-3.156
2.4000	-3.156
2.6000	-3.153
2.8000	-3.153
3.0000	-3.156
3.2000	-3.156
3.4000	-3.156
3.6000	-3.153
3.8000	-3.153
4.0000	-3.153
4.2000	-3.153
4.4000	-3.153
4.6000	-3.153
4.8000	-3.153
5.0000	-3.153
5.2000	-3.156
5.4000	-3.153
5.6000	-3.153
5.8000	-3.153

6.0000	-3.153
6.2000	-3.153
6.4000	-3.153
6.6000	-3.150
6.8000	-3.150
7.0000	-3.150
7.2000	-3.150
7.4000	-3.150
7.6000	-3.150
7.8000	-3.150
8.0000	-3.150
8.2000	-3.150
8.4000	-3.150
8.6000	-3.150
8.8000	-3.150
9.0000	-3.150
9.2000	-3.150
9.4000	-3.150
9.6000	-3.150
9.8000	-3.150
10.0000	-3.146
12.0000	-3.146
14.0000	-3.146

SE1000C
Environmental Logger
08/31 16:35

Unit# 00568 Test 4

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00043
Reference	0.000
Linearity	0.000
Scale factor	10.000
Offset	0.020
Delay mSEC	50.000

Step 1 06/23 13:44:13

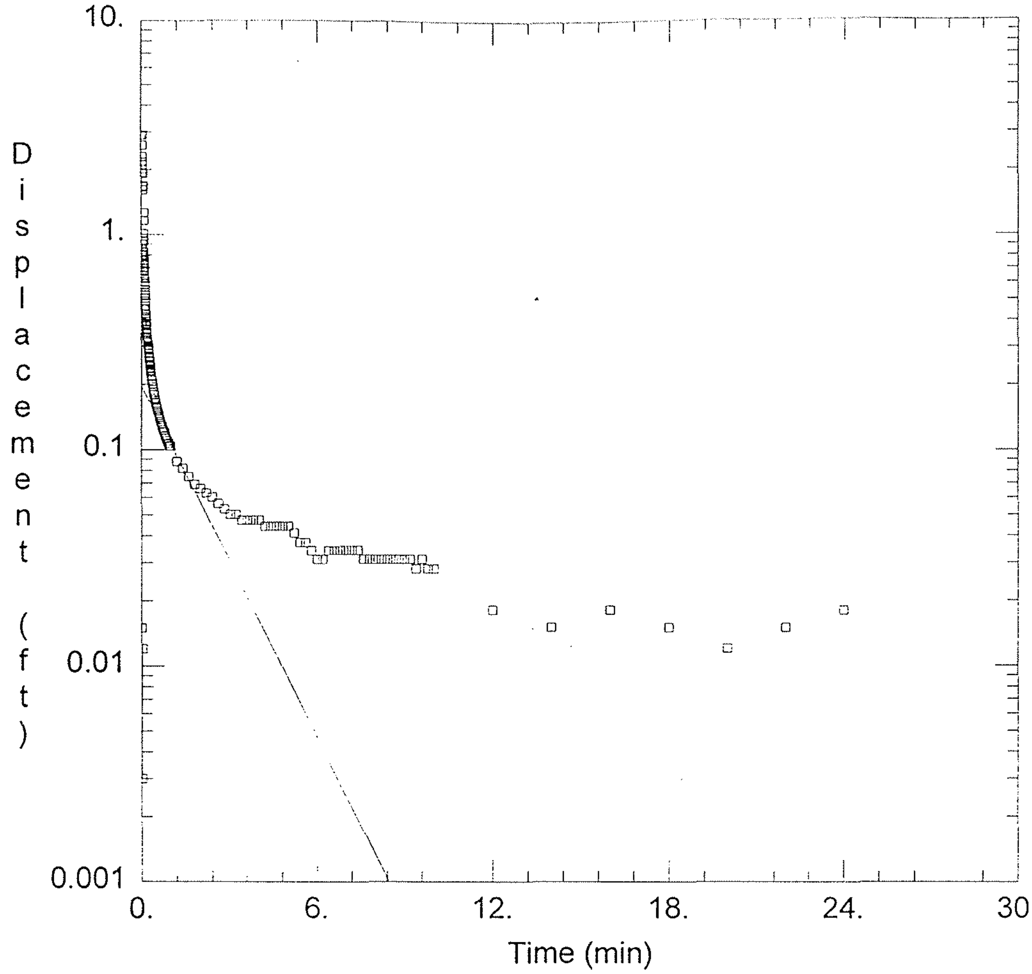
Elapsed Time	INPUT 1
0.0000	-3.156
0.0033	-3.159
0.0066	-3.159
0.0100	-1.352
0.0133	-0.218
0.0166	0.170
0.0200	0.154
0.0233	-1.601
0.0266	-1.128
0.0300	-1.191
0.0333	-1.188
0.0366	-1.225
0.0400	-1.251
0.0433	-1.276
0.0466	-1.336
0.0500	-1.317
0.0533	-1.364
0.0566	-1.412
0.0600	-1.406
0.0633	-1.424
0.0666	-1.418
0.0700	-1.453
0.0733	-1.469
0.0766	-1.485

0.0800	-1.519
0.0833	-1.522
0.0866	-1.541
0.0900	-1.551
0.0933	-1.573
0.0966	-1.592
0.1000	-1.608
0.1033	-1.624
0.1066	-1.642
0.1100	-1.658
0.1133	-1.674
0.1166	-1.690
0.1200	-1.706
0.1233	-1.721
0.1266	-1.737
0.1300	-1.750
0.1333	-1.766
0.1366	-1.782
0.1400	-1.797
0.1433	-1.810
0.1466	-1.826
0.1500	-1.838
0.1533	-1.851
0.1566	-1.864
0.1600	-1.879
0.1633	-1.892
0.1666	-1.905
0.1700	-1.917
0.1733	-1.933
0.1766	-1.946
0.1800	-1.955
0.1833	-1.968
0.1866	-1.984
0.1900	-1.993
0.1933	-2.006
0.1966	-2.018
0.2000	-2.031
0.2033	-2.041
0.2066	-2.053
0.2100	-2.066
0.2133	-2.075
0.2166	-2.088
0.2200	-2.097
0.2233	-2.110
0.2266	-2.120
0.2300	-2.132
0.2333	-2.142

0.2366	-2.151
0.2400	-2.161
0.2433	-2.173
0.2466	-2.183
0.2500	-2.192
0.2533	-2.202
0.2566	-2.214
0.2600	-2.224
0.2633	-2.233
0.2666	-2.243
0.2700	-2.249
0.2733	-2.259
0.2766	-2.271
0.2800	-2.278
0.2833	-2.287
0.2866	-2.297
0.2900	-2.303
0.2933	-2.312
0.2966	-2.322
0.3000	-2.331
0.3033	-2.341
0.3066	-2.347
0.3100	-2.357
0.3133	-2.366
0.3166	-2.372
0.3200	-2.379
0.3233	-2.388
0.3266	-2.398
0.3300	-2.404
0.3333	-2.410
0.3500	-2.454
0.3666	-2.492
0.3833	-2.530
0.4000	-2.565
0.4166	-2.597
0.4333	-2.628
0.4500	-2.657
0.4666	-2.685
0.4833	-2.710
0.5000	-2.736
0.5166	-2.758
0.5333	-2.780
0.5500	-2.802
0.5666	-2.821
0.5833	-2.837
0.6000	-2.856
0.6166	-2.871

0.6333	-2.887
0.6500	-2.900
0.6666	-2.916
0.6833	-2.928
0.7000	-2.938
0.7166	-2.950
0.7333	-2.960
0.7500	-2.973
0.7666	-2.982
0.7833	-2.992
0.8000	-2.998
0.8166	-3.007
0.8333	-3.014
0.8500	-3.020
0.8666	-3.026
0.8833	-3.036
0.9000	-3.039
0.9166	-3.045
0.9333	-3.052
0.9500	-3.058
0.9666	-3.061
0.9833	-3.064
1.0000	-3.071
1.2000	-3.112
1.4000	-3.127
1.6000	-3.134
1.8000	-3.140
2.0000	-3.140
2.2000	-3.143
2.4000	-3.143
2.6000	-3.143
2.8000	-3.143
3.0000	-3.146
3.2000	-3.146
3.4000	-3.146
3.6000	-3.146
3.8000	-3.146
4.0000	-3.146
4.2000	-3.146
4.4000	-3.146
4.6000	-3.146
4.8000	-3.146
5.0000	-3.146
5.2000	-3.143
5.4000	-3.143
5.6000	-3.146
5.8000	-3.146

6.0000	-3.146
6.2000	-3.146
6.4000	-3.146
6.6000	-3.146
6.8000	-3.146
7.0000	-3.146
7.2000	-3.146
7.4000	-3.146
7.6000	-3.146
7.8000	-3.146
8.0000	-3.146
8.2000	-3.146
8.4000	-3.146
8.6000	-3.146
8.8000	-3.146
9.0000	-3.146
9.2000	-3.146
9.4000	-3.146
9.6000	-3.146
9.8000	-3.146
10.0000	-3.143
12.0000	-3.146
14.0000	-3.146



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw44i.aqt
Date: 09/24/99 Time: 11:06:30

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Test Location: Birmingham, AL
Test Well: MW-44 Slug Out
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 27.37 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-44i)

Initial Displacement: 2.9 ft Water Column Height: 27.37 ft
Casing Radius: 0.08333 ft Wellbore Radius: 0.25 ft
Screen Length: 10. ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

AQTESOLV for Windows

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw44i.aqt
Date: 09/24/99
Time: 11:06:40

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-44 Slug Out

AQUIFER DATA

Saturated Thickness: 27.37 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-44i

X Location: 0. ft
Y Location: 0. ft

No. of observations: 186

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0166	0.015	0.23	0.319	0.85	0.113
0.0233	0.003	0.2333	0.312	0.8666	0.113
0.0266	0.012	0.2366	0.312	0.8833	0.11
0.03	0.012	0.24	0.303	0.9	0.11
0.0366	0.793	0.2433	0.303	0.9166	0.107
0.04	0.391	0.2466	0.297	0.9333	0.107
0.0433	0.897	0.25	0.293	0.95	0.107
0.0466	1.611	0.2533	0.29	0.9666	0.104
0.05	2.3	0.2566	0.29	0.9833	0.104
0.0533	2.603	0.26	0.281	1.	0.104
0.0566	2.9	0.2633	0.278	1.2	0.088
0.06	1.924	0.2666	0.278	1.4	0.082
0.0633	1.68	0.27	0.271	1.6	0.075
0.0666	2.167	0.2733	0.271	1.8	0.069
0.07	2.015	0.2766	0.268	2.	0.066
0.0733	1.943	0.28	0.265	2.2	0.063
0.0766	1.668	0.2833	0.262	2.4	0.06
0.08	1.004	0.2866	0.259	2.6	0.056

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0833	0.821	0.29	0.259	2.8	0.053
0.0866	0.919	0.2933	0.255	3.	0.05
0.09	1.26	0.2966	0.249	3.2	0.05
0.0933	1.159	0.3	0.249	3.4	0.047
0.0966	0.676	0.3033	0.243	3.6	0.047
0.1	0.827	0.3066	0.246	3.8	0.047
0.1033	0.932	0.31	0.24	4.	0.047
0.1066	0.808	0.3133	0.24	4.2	0.044
0.11	0.796	0.3166	0.236	4.4	0.044
0.1133	0.777	0.32	0.233	4.6	0.044
0.1166	0.751	0.3233	0.233	4.8	0.044
0.12	0.723	0.3266	0.23	5.	0.044
0.1233	0.698	0.33	0.227	5.2	0.041
0.1266	0.673	0.3333	0.227	5.4	0.037
0.13	0.647	0.35	0.218	5.6	0.037
0.1333	0.625	0.3666	0.208	5.8	0.034
0.1366	0.603	0.3833	0.202	6.	0.031
0.14	0.584	0.4	0.195	6.2	0.031
0.1433	0.568	0.4166	0.189	6.4	0.034
0.1466	0.549	0.4333	0.183	6.6	0.034
0.15	0.533	0.45	0.18	6.8	0.034
0.1533	0.518	0.4666	0.173	7.	0.034
0.1566	0.505	0.4833	0.17	7.2	0.034
0.16	0.489	0.5	0.164	7.4	0.034
0.1633	0.477	0.5166	0.161	7.6	0.031
0.1666	0.464	0.5333	0.157	7.8	0.031
0.17	0.451	0.55	0.154	8.	0.031
0.1733	0.442	0.5666	0.151	8.2	0.031
0.1766	0.429	0.5833	0.148	8.4	0.031
0.18	0.42	0.6	0.145	8.6	0.031
0.1833	0.41	0.6166	0.142	8.8	0.031
0.1866	0.401	0.6333	0.139	9.	0.031
0.19	0.394	0.65	0.135	9.2	0.031
0.1933	0.385	0.6666	0.135	9.4	0.028
0.1966	0.379	0.6833	0.132	9.6	0.031
0.2	0.372	0.7	0.129	9.8	0.028
0.2033	0.363	0.7166	0.129	10.	0.028
0.2066	0.357	0.7333	0.126	12.	0.018
0.21	0.35	0.75	0.123	14.	0.015
0.2133	0.344	0.7666	0.123	16.	0.018
0.2166	0.341	0.7833	0.12	18.	0.015
0.22	0.334	0.8	0.12	20.	0.012
0.2233	0.328	0.8166	0.116	22.	0.015
0.2266	0.322	0.8333	0.116	24.	0.018

SOLUTION

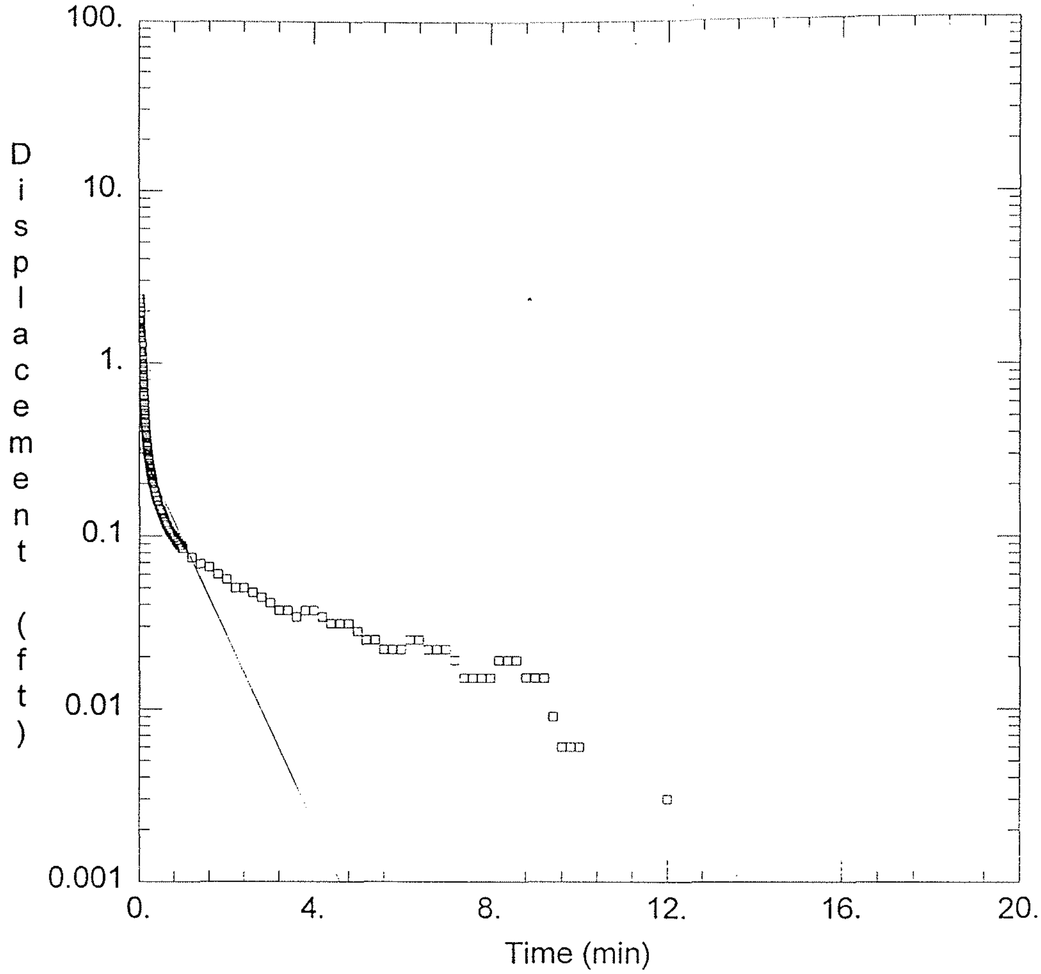
Aquifer Model: Confined

Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0007421	ft/min
y0	0.1961	ft



WELL TEST ANALYSIS

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw44o.aqt
Date: 09/24/99 Time: 11:24:37

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Test Location: Birmingham, AL
Test Well: MW-44 Slug Out
Test Date: June 1999

AQUIFER DATA

Saturated Thickness: 27.37 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-44o)

Initial Displacement: 2.341 ft Water Column Height: 27.37 ft
Casing Radius: 0.08333 ft Wellbore Radius: 0.25 ft
Screen Length: 10. ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

Data Set: G:\PROJ\TF320\BTFSEWER\Slug\mw44o.aqt
Date: 09/24/99
Time: 11:24:44

PROJECT INFORMATION

Company: ARCADIS Geraghty & Miller
Client: Sloss
Project: TF000320.0013.0016
Location: Birmingham, AL
Test Date: June 1999
Test Well: MW-44 Slug Out

AQUIFER DATA

Saturated Thickness: 27.37 ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: MW-44o

X Location: 0. ft
Y Location: 0. ft

No. of observations: 182

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0166	1.611	0.22	0.284	0.7833	0.098
0.02	1.731	0.2233	0.281	0.8	0.098
0.0233	1.759	0.2266	0.278	0.8166	0.098
0.0266	1.491	0.23	0.274	0.8333	0.094
0.03	1.143	0.2333	0.271	0.85	0.094
0.0333	2.233	0.2366	0.268	0.8666	0.091
0.0366	2.341	0.24	0.262	0.8833	0.091
0.04	1.974	0.2433	0.259	0.9	0.091
0.0433	1.86	0.2466	0.255	0.9166	0.088
0.0466	1.715	0.25	0.252	0.9333	0.088
0.05	1.601	0.2533	0.249	0.95	0.088
0.0533	1.5	0.2566	0.246	0.9666	0.088
0.0566	1.405	0.26	0.243	0.9833	0.085
0.06	1.298	0.2633	0.24	1.	0.085
0.0633	1.251	0.2666	0.24	1.2	0.075
0.0666	1.159	0.27	0.237	1.4	0.069
0.07	1.086	0.2733	0.233	1.6	0.066
0.0733	1.048	0.2766	0.23	1.8	0.06

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.0766	0.988	0.28	0.227	2.	0.056
0.08	0.951	0.2833	0.227	2.2	0.05
0.0833	0.909	0.2866	0.224	2.4	0.05
0.0866	0.843	0.29	0.221	2.6	0.047
0.09	0.824	0.2933	0.221	2.8	0.044
0.0933	0.78	0.2966	0.218	3.	0.041
0.0966	0.751	0.3	0.214	3.2	0.037
0.1	0.72	0.3033	0.214	3.4	0.037
0.1033	0.682	0.3066	0.211	3.6	0.034
0.1066	0.647	0.31	0.208	3.8	0.037
0.11	0.638	0.3133	0.208	4.	0.037
0.1133	0.612	0.3166	0.205	4.2	0.034
0.1166	0.587	0.32	0.205	4.4	0.031
0.12	0.568	0.3233	0.202	4.6	0.031
0.1233	0.546	0.3266	0.199	4.8	0.031
0.1266	0.533	0.33	0.199	5.	0.028
0.13	0.511	0.3333	0.199	5.2	0.025
0.1333	0.499	0.35	0.189	5.4	0.025
0.1366	0.48	0.3666	0.18	5.6	0.022
0.14	0.467	0.3833	0.173	5.8	0.022
0.1433	0.454	0.4	0.167	6.	0.022
0.1466	0.442	0.4166	0.161	6.2	0.025
0.15	0.429	0.4333	0.158	6.4	0.025
0.1533	0.42	0.45	0.151	6.6	0.022
0.1566	0.407	0.4666	0.148	6.8	0.022
0.16	0.398	0.4833	0.142	7.	0.022
0.1633	0.388	0.5	0.139	7.2	0.019
0.1666	0.382	0.5166	0.135	7.4	0.015
0.17	0.372	0.5333	0.132	7.6	0.015
0.1733	0.366	0.55	0.129	7.8	0.015
0.1766	0.357	0.5666	0.126	8.	0.015
0.18	0.35	0.5833	0.123	8.2	0.019
0.1833	0.344	0.6	0.12	8.4	0.019
0.1866	0.338	0.6166	0.116	8.6	0.019
0.19	0.331	0.6333	0.116	8.8	0.015
0.1933	0.325	0.65	0.113	9.	0.015
0.1966	0.319	0.6666	0.11	9.2	0.015
0.2	0.312	0.6833	0.107	9.4	0.009
0.2033	0.309	0.7	0.107	9.6	0.006
0.2066	0.303	0.7166	0.104	9.8	0.006
0.21	0.3	0.7333	0.104	10.	0.006
0.2133	0.293	0.75	0.101	12.	0.003
0.2166	0.29	0.7666	0.101		

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.001495	ft/min
y0	0.3291	ft

APPENDIX D

Survey Data

SLOSS 1999 SURVEY DATA

4124	1297990	713561.8623	586.39	NWH 3050/MAG NAI	
4125	1298397	713816.5982	584.14	NWH 3051	
4126	1298245	713994.2041	581.864034	36-SB0001	
4127	1297456	713685.5308	582.352755	31-SB0002	
4128	1297479	713663.0593	582.016946	31-SB0001	
4129	1297568	713725.4431	584.05038	27-SB0002	
4130	1297585	713755.5988	584.348721	27-SB0001	
4131	1297549	713819.3952	583.579791	29-SB0001	
4132	1297569	713980.2249	581.558912	TACK	
4133	1297508	713877.1864	583.151189	29-SB0002	
4134	1297471	713867.8898	583.807168	26-SB0001	
4135	1297415	713933.5194	582.976486	26-SB0002	
4136	1302324	715490.333	536.81	NWH 3001	
4137	1301965	716403.104	533.47	NWH 3002	
4138	1302017	716484.6707	530.809906	MW 42	SE=528.7799
4139	1302000	716422.7829	530.919319	MW 41	SE=528.2093
4140	1302049	716437.8705	532.160528	MW 43	SE=529.5405
4141	1302157	715986.5532	531.655546	MAG NAIL	
4142	1302303	716138.6488	534.346286	MAG NAIL	
4143	1302361	716362.3212	533.718981	PK NAIL	
4144	1302284	716064.6015	533.71133	TIEIN 3924	
4145	1302318	716247.9086	534.487771	MW 38	SE=534.6077
4146	1302374	716279.1453	534.329375	MW 39	SE=534.4493
4147	1302342	716406.0741	537.667144	MW 40	SE=535.0371
4148	1302558	716350.3543	536.027923	MW 44	SE=539.9179

RCRA FACILITY INVESTIGATION LAND DISPOSAL AREAS VOLUME I OF III

REPORT

Sloss Industries, Inc.
Birmingham, Alabama

ARCADIS
GERAGHTY & MILLER

Address:
14497 North Dale Mabry Hwy
Suite 115
Tampa, Florida 33618

REPORT

January 1998

TABLE OF CONTENTS

Page

FIGURES

TABLES

APPENDICES

GLOSSARY OF ABBREVIATIONS

AIHC	American Industrial Health Council
AP	Averaging Period
ASI	Analytical Services Incorporated
ASTM	American Society for Testing Materials
atoc	Above Top of Casing
ATSDR	Agency for Toxic Substance and Disease Registry
bls	Below Land Surface
BSC	Benzene Sulfonyl Chloride
BTF	Biological Treatment Facility
BW	Body Weight
CDC	Center for Disease Control
CFR	Code of Federal Regulation
cm/sec	Centimeters per Second
cm^2	Square Centimeters
COC	Constituents of Concern
COEC	Constituents of Ecological Concern
CSF	Cancer Slope Factor
Cveg	Constituent Concentrations in Vegetation
DOT	Department of Transportation
ECG	Electrocardiogram
EEC	Expert Environmental Concentrations
EF	Exposure Frequency
EI	Ecological Inventory
ELCR	Excess Lifetime Cancer Risk
EP	Exposure Period
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESD	Environmental Services Division
ESOD	Erythrocyte Superoxide Dismutase
FID	Flame Ionization Detector
FSP	Field Sampling Plan
ft	Feet
ft amsl	Feet Above Mean Sea Level
ft bls	Feet Below Land Surface
ft btoc	Feet Below Top of Casing
ft/ft	Feet per Foot
ft/sec	Feet per Second
ft/yr	Feet per Year
FWI	Facility-Wide Investigation
g	Gram
GI	Gastrointestinal
gpm	Gallons Per Minute

HDL	High Density Lipid
HEAST	Health Effects Assessment Summary Tables
HHC	Hillsborough Holding Corporation
HI	Hazard Index
HQ	Hazard Quotient
HSWA	Hazardous and Solid Waste Amendment
Hz	Hertz
I.D.	Inner Diameter
I.Q.	Intelligence Quotient
IDW	Investigation Derived Waste
IRIS	Integrated Risk Information System
JWC	Jim Walters Corporation
kg	Kilograms
Kg-day/mg	Kilogram-day per Milligram
K_{ow}	Octonal-Water Partitioning Coefficient
L/day	Liters per Day
$1b/ft^3$	Pounds per Cubic Foot
LD_{50}	Lethal Dose
LOAELs	Lowest Observed Adverse Effect Levels
m^3/ug	Cubic Meters per Microgram
MCL	Maximum Contaminant Level
mg	Milligrams
mg/cm^2	Milligrams per Square Centimeter
mg/day	Milligrams per Day
mg/kg	Milligrams per Kilogram
mg/kg/day	Milligrams per Kilograms per Day
mg/L	Milligrams per Liter
mg/m^3	Milligrams per Cubic Meter
mL	Milliliter
msl	Mean Sea Level
NOAELs	No Observed Adverse Effect Levels
O.D.	Outer Diameter
ORNL	Oak Ridge National Laboratory
OVM	Organic Vapor Monitor
PAH	Polycyclic Aromatic Hydrocarbon
PDF	Probability Density Function
PID	Photo Ionization Detector
PP	Priority Pollutant
PRGs	Preliminary Soil Remediation Goals
PU	Soil-to-Plant Uptake Factors
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Controls
RAGS	Risk Assessment Guidance for Superfund

RBC	Risk-Based Concentration
RCRA	Resource Conservation Recovery Act
RFA	RCRA Facility Assessment
RfCs	Reference Concentrations
RfD	Reference Dose
RfDos	Reference Doses for Oral Exposure
RFI	RCRA Facility Investigation
RGOs	Remedial Goal Options
RME	Reasonable Maximum Exposure
SAR	Soil Adherence Rate
SD	Standard Deviation
Sloss	Sloss Industries Corporation
SQL	Sample Quantitation Limit
SSA	Skin Surface Area
SSSIC	Sloss Sheffield Steel and Iron Company
SVOC	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
TC	Toxicity Characteristic
TCLP	Toxicity Characteristic Leaching Procedure
TEF	Toxicity Equivalency Factor
TSA	Toluene Sulfonic Acid
UCL	Upper Confidence Level
ug/day	Micrograms per Day
ug/dl	Micrograms per Deciliter
ug/g	Micrograms per Gram
ug/kg	Micrograms per Kilogram
ug/L	Micrograms per Liter
Ur_i	Unit Risk Factor
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
VSI	Visual Site Inspection
WHO	World Health Organization
Zn	Zinc

sludge material and assess the potential for these constituents to leach from the sludge. Soil sampling was conducted to confirm the presence or absence of soil contamination around the waste pile.

Area 3 - Landfill (SWMU 38) and Blast Furnace Emission Control Sludge Waste Pile (SWMU 39): The RFI investigation for SWMUs 38 and 39 consisted of the following tasks:

1. Seismic, conductivity, and resistivity geophysical surveys: The seismic survey was conducted to provide data on the depth to bedrock and the conductivity and resistivity surveys were conducted to identify areas with highly conductive materials in the soil and groundwater.

2. Sludge sampling: Sludge sampling was performed at SWMU 39 to evaluate the potential contaminants present in the sludge material and assess the potential for these constituents to leach from the sludge.

3. Installation of soil borings and soil sampling: Subsurface soil sampling was conducted to confirm the presence or absence of soil contamination at the monitor well locations.

4. Installation of 14 monitor wells: The monitor wells were installed to collect lithologic data, water level data, evaluate the hydraulic conductivity of the aquifer, and assess groundwater quality.

5. Hydraulic conductivity testing of the aquifer: Aquifer tests were conducted on each monitor well in order to determine hydraulic conductivities and groundwater flow velocities.

6. Groundwater sampling: Groundwater sampling was conducted to confirm the presence or absence of groundwater contamination at SWMUs 38 and 39.

Risk Assessment: Using data generated from the RFI, a health and environmental assessment was prepared to evaluate the risks associated with the Land Disposal Areas SWMUs.

1.0 INTRODUCTION

Sloss Industry Corporation (Sloss) located in Jefferson County, Alabama, is evaluating past waste management practices in accordance with the regulations set forth by the Hazardous and Solid Waste Amendments (HSWA) of the Resource Conservation Recovery Act (RCRA) (Figure 1-1). In August 1990, ARCADIS Geraghty & Miller, Inc. was contracted by Sloss to prepare and implement a RCRA Facility Investigation (RFI) Work Plan for 39 solid waste management units (SWMUs) identified at the Sloss Facility during the RCRA Facility Assessment (RFA) (Figure 1-2). A RFI Work Plan was prepared and approved by the United States Environmental Protection Agency (USEPA) in May 1995. The Work Plan describes the investigations that will be conducted to characterize the nature, extent, and rate of contaminant migration from the SWMUs identified at the Facility.

In the RFI Work Plan, the SWMUs were separated into four separate areas: Coke Manufacturing Plant, Land Disposal Areas, Biological Treatment Facility (BTF) and Sewers, and Chemical Manufacturing Plant (Table 1-1 and Figure 1-2). These areas were created to group similar industrial activities together and allow for a systematic implementation of the investigation activities at each area. Initially, a Facility-Wide investigation (FWI) was completed in June through August 1995 to develop a conceptual hydrogeologic and hydrologic model of the Sloss Facility. The conceptual model details information on groundwater and surface water flow for use in assessing possible contaminant transport for future SWMU investigations. The RFI Facility-Wide Report was submitted to the USEPA in February 1996.

After completion of the RFI Facility-Wide Report, Sloss began focusing on the areas within the Facility as specified in the RFI Work Plan. Each of the four areas (Coke Manufacturing Plant, Land Disposal Areas, BTF and Sewers, and Chemical Manufacturing Plant) are being sequentially investigated and evaluated. The Coke Manufacturing Plant investigation was conducted in June 1996 and the RFI report for this area was submitted to the USEPA in February 1997. The Land Disposal Areas investigation was conducted from June to August 1997. RFIs for the remaining SWMU areas will be implemented in 1998 (BTF and Sewers), and 1999 (Chemical Manufacturing Plant). This RFI Land Disposal Areas Report summarizes the results of the Land Disposal Areas investigation.

1.1 SITE BACKGROUND

The Sloss Facility began operation in 1919 as Sloss Sheffield Steel and Iron Company (SSSIC) producing foundry and furnace coke and coke by-products. The Coke Manufacturing Plant consisted of five coke batteries which contained 240 coke ovens. Coke batteries 1 and 2, consisting of 120 coke ovens, were taken out of service in 1979. The coke product, produced through a process of carbonization, is sold primarily to the steel industry as furnace coke. The Coke Manufacturing Plant is currently operating and is located at the southwest part of the Sloss Facility (Figure 1-2).

In 1939, SSSIC merged with United States Pipe and Foundry Company and in 1948 the Facility constructed a Chemical Manufacturing Plant which produced Toluene Sulfonic Acid (TSA) 94. Sloss later expanded operations by manufacturing sulfones through a sulfonization process of sulfuric acid and benzenesulfonyl chloride (BSC). The Chemical Manufacturing Plant is located at the southeast part of the Sloss Facility and is currently operating (Figure 1-2).

A Mineral Wool Plant was constructed northeast of the Chemical Manufacturing Plant in 1950 and is currently operating (Figure 1-2). The plant manufactures mineral fibers which are used for ceiling tiles and insulating products.

In 1958, an iron blast furnace began operation at the Facility and produced pig iron from iron ore. The blast furnace ceased operation in 1979 and was removed in 1984.

Jim Walter Corporation (JWC) bought this Facility in 1960 and constructed a BTF located in the northern part of the Sloss Facility in 1973 (Figure 1-2). The BTF was designed to treat wastewater generated at the Facility. The wastewater that is generated enters a BTF Sewer System and is directed to the northeast part of the Facility where the BTF is currently operating. In 1988, the JWC sold controlling interest to Hillsborough Holding Corporation (HHC), and Sloss Industries Corporation became a wholly-owned subsidiary of HHC.

1.2 OBJECTIVES

The objectives of the Land Disposal Areas RFI are to: (1) confirm the presence or absence of contamination at the site; (2) determine the extent and degree of contamination at the site; (3) identify and characterize the sources of contamination for the site; (4) assess the potential for contaminant migration to surrounding environments; (5) identify public health and environmental risks of any contaminants; and (6) define the scope of future investigations and/or actions at the site.

To meet the RFI objectives, each of the identified Land Disposal Areas SWMUs were evaluated to assess whether releases to the environment have occurred. The presence or absence of contamination was investigated at each Land Disposal Areas SWMU by collecting samples of potentially affected media (sludge, subsurface and surficial soil, and groundwater). Geophysical surveys (seismic, conductivity, and resistivity surveys) were performed around the perimeters of SWMU 23 and SWMUs 38 and 39 to provide data on the depth to bedrock and identify areas with highly conductive materials in the soil or groundwater. A risk assessment was prepared to identify public health and environmental risks of any contaminants. Additionally, data collected during the Land Disposal Areas RFI was also used to revise the conceptual site model which was developed during the FWI and subsequently modified with data collected during the Coke Manufacturing Plant investigation.

1.3 SCOPE

The land disposal operations at the Sloss Facility consists of three distinct areas (SWMU 23, SWMU 24, and SWMUs 38 and 39) for purposes of this investigation. These SWMUs are areas where materials generated from various on-site processes have been placed on the ground. SWMUs 38 and 39 are two adjacent units and are being evaluated as one unit hydrogeologically because of their close proximity.

Area 1 - Biological Sludge Disposal Area (SWMU 23): The RFI investigation for SWMU 23 consisted of the following tasks:

1. Seismic and conductivity geophysical surveys: The seismic survey was conducted to provide data on the depth to bedrock and the conductivity survey was conducted to identify areas with highly conductive materials in the soil and groundwater.

2. Sludge sampling: Sludge sampling was performed to evaluate the potential contaminants present in the sludge material and assess the potential for these constituents to leach from the sludge.

3. Installation of soil borings and soil sampling: Subsurface soil sampling was conducted to confirm the presence or absence of soil contamination at the monitor well locations.

4. Installation of six monitor wells: The monitor wells were installed to collect lithologic data, water level data, evaluate the hydraulic conductivity of the aquifer, and assess groundwater quality.

5. Hydraulic conductivity testing of the aquifer: Aquifer tests were conducted on each monitor well in order to determine hydraulic conductivities and groundwater flow velocities.

6. Groundwater sampling. Groundwater sampling was conducted to confirm the presence or absence of groundwater contamination at SWMU 23.

Area 2 - Blast Furnace Emission Control Sludge Waste Pile (SWMU 24): Sludge sampling was performed to evaluate the potential contaminants present in the

2.0 STUDY AREA

2.1 TOPOGRAPHY

Sloss is located in the Birmingham Valley District of the Alabama Valley and Ridge Physiographic section. The Birmingham Valley trends northeast-southwest and is characterized as essentially flat, low lying, and is bound to the southeast by Red Mountain and to the northwest by Sand Mountain (Figure 2-1).

Land surface elevations on the Sloss Facility range between 540 and 560 feet above mean sea level (ft amsl) except at the northwest portion of the Facility where Sand Mountain is exposed. Approximately 180 feet of relief is present from Sand Mountain to the Sloss Facility. Drainage from Sand Mountain trends southeast directing surface water toward the Sloss Facility (Figure 1-1).

2.2 SURFACE WATER

The Sloss Facility lies in the Black Warrior River Basin. Two tributaries of the Locust Fork of the Black Warrior River occur in the vicinity of the Sloss Facility, Five Mile Creek located along the northern boundary of the Facility and Village Creek located approximately 1.5 miles south of the Facility. In the vicinity of the Sloss Facility, Five Mile Creek flows to the west and Village Creek flows to the southwest.

Surface water at the Sloss Facility is limited to a drainage ditch located along the eastern property boundary of the Sloss Facility. This drainage ditch is located north of SWMU 38 and extends from near monitor well MW-32 located adjacent to the LaFarge Quarry northward to Five Mile Creek where it discharges (Figure 2-2). Several drainage ditches which collect storm water runoff are also located adjacent to the Land Disposal Areas SWMUs. Storm water drainage ditches are located north and south of Summit Street which is located between SWMUs 38 and 39 and SWMU 24 and east of SWMU

24 along the driveway into the BTF. Additionally, a swale is located along the northern boundary of SWMU 24. SWMU 25, the Storm Water Runoff Sewer, which collects storm water and non-contact cooling water from the Sloss Facility, is located along the northwestern boundary of SWMUs 38 and 39 and approximately 50 feet west of SWMU 24. There are no surface-water bodies in the Land Disposal Areas SWMUs; however, SWMU 22, the Polishing Pond, which is a large surface impoundment, is located north of SWMU 24. Water from SWMU 25 drains into the polishing pond before permitted discharge to Five Mile Creek.

2.3 GEOLOGY

2.3.1 Regional Setting

The Sloss Facility is situated within the Valley and Ridge province at the southern end of the Appalachian Mountains (Figure 2-1). The Valley and Ridge province in the Birmingham area is underlain by more than 10,000 feet of sedimentary rock that range in age from Cambrian to Holocene. A generalized stratigraphic section of rocks in the area is presented in Figure 2-3. The Valley and Ridge Province is a structurally complex geologic feature that developed at the end of the Paleozoic Era in response to tectonic stresses during the deformation of the Appalachian fold mountain belt. Northwest trending faults and folds and thrust faults are typical of the Appalachian fold mountain belt. Structurally, the Valley and Ridge Province includes the Birmingham anticlinorium, Cahaba synclinorium, and the western edge of the Coosa synclinorium which are generally faulted and folded (Kidd and Shannon, 1977) (Figures 2-4 and 2-5). After development of the Valley and Ridge Province, the structures were subsequently modified by erosion.

The Birmingham anticlinorium is a major thrust faulted fold which trends northeast-southwest (Thomas and Bearce, 1986). The Sloss Facility is located on the Blount Mountain syncline which is the northwest limb of the Birmingham anticlinorium (Figure 2-5).

Several structural features are present on the Birmingham anticlinorium including the Opossum Valley thrust fault, which occurs in the area of the Sloss Facility, and the Jones Valley thrust fault (Figures 2-4 and 2-5). The Opossum Valley thrust fault is a northeast-southwest trending fault located on the northwestern limb of the Birmingham anticlinorium. It has a displacement of 7,000 feet or more where older carbonate rocks of the Conasauga Formation, Ketona Dolomite, and Knox Group have been thrusted from the southeast over younger Paleozoic clastic rocks (Kidd and Richter, 1979). Numerous faults and fault splays are associated with the Opossum Valley fault, and formations immediately west of the fault are typically overturned, deformed, and faulted (Kidd and Richter, 1979).

2.3.2 Facility Geology

The Sloss Facility is underlain by sedimentary rocks that range in age from Cambrian to Pennsylvanian as presented in Figure 2-6, a geologic map of the site. South of Summit Street, the Opossum Valley fault trace is located at the northwest perimeter of the Sloss Facility property. North of Summit Street in the BTF area, the Opossum Valley fault trace bisects the property in the area of the Polishing Pond (Figure 2-6). The hanging wall of the fault is located in the Sloss Facility plant area and the footwall of the fault is located on and adjacent to Sand Mountain (Figure 2-6).

Northwest of the Opossum Valley fault trace, on the footwall of the fault, the Sloss Facility including SWMU 23 is underlain by strata ranging from Silurian to Pennsylvanian in age (Figure 2-6). A fault slice of folded strata ranging in age from Silurian and older to Mississippian, which is part of an anticline structure, is present between the hanging wall and footwall of the Opossum Valley fault (Figure 2-6). The rocks exposed on Sand Mountain are inclined and dip to the southeast from 28° to 77°.

Southeast of the Opossum Valley fault trace, on the hanging wall of the fault, the Sloss Facility including SWMU 24 and SWMUs 38 and 39, is underlain by the Conasauga

Formation of Cambrian Age as presented in Figure 2-6. The rocks in the Conasauga Formation are inclined and dip to the southeast from 26° to 35°. A northeast-southwest geologic cross section of the Sloss Facility which bisects SWMU 24 and parallels the northwestern boundary of SWMUs 38 and 39 was constructed along the line indicated in Figure 2-2. The northeast-southwest cross section is presented in Figure 2-7.

The Conasauga Formation, which underlies the Land Disposal Areas, varies from 1,100 to 1,900 feet in thickness. In the area of the Opossum Valley fault, the stratigraphic thickness of the Conasauga Formation is probably much thinner than 1,100 to 1,900 feet. The Conasauga Formation consists of relatively few micrite zones, with larger proportions of very fine grained sparite and argillaceous sparite, and several zones containing somewhat dolomitic edgewise conglomerates (Brockman, 1978). The micrite tends to be light-gray, the sparite being darker in color, and the argillaceous rocks being darker than the purer limestone.

Lithologic data collected during the FWI indicates that the top two feet of the Conasauga Formation at most locations is composed of highly weathered limestone. Below the upper weathered surface of the Conasauga Formation, the limestone was generally massive with very few fractures. The blocks of limestone encountered during the FWI drilling were typically, medium gray in color and hard with thin (1- to 2-foot) lenses of softer, darker gray shale and shaley limestone; however, occasionally thin (2- to 12-inch) fracture zones were encountered. The limestone in these fracture zones was usually broken up and any remaining voids were infilled with calcite crystals. Areas of fractured limestone were generally within the upper 50 feet of the Conasauga Formation and became more infrequent with greater depth. Based on lithologic and geophysics data, the Conasauga Limestone at depth appears to be hard with little secondary porosity.

The underlying rocks of the Sloss Facility have been structurally deformed in response to thrust faulting, resulting in the development of an extensive network of faults and joints. The stress associated with the folding and faulting has created major joint traces in the Conasauga Formation which trend northeast and northwest at the Sloss Facility. Two systematic sets of joints were found in quarries adjacent to the site, one set strikes approximately N45°E and dips approximately 60°NW and are approximately perpendicular to bedding and the second set strikes N30°W and has subvertical dips. Many of the joints of both sets are calcite healed, although some were observed to have reopened.

2.3.3 Bedrock Topography

The bedrock topography of the Sloss Facility generally slopes to the north towards Five Mile Creek and top of bedrock elevation ranges from 574.2 ft amsl at the southwestern end of the site to 507 ft amsl near Five Mile Creek. In the Land Disposal SWMU Area, the bedrock elevations range from 517.8 to 625.7 ft amsl (Figure 2-8). Bedrock elevations in the area of SWMU 24 and SWMUs 38 and 39 range from 517.8 to 554.5 ft amsl and bedrock elevations on Sand Mountain (SWMU 23) range from 532.8 to 625.7 ft amsl. Depth to bedrock in the SWMU 24 and SWMUs 38 and 39 area is generally between 11 and 23 feet below land surface (ft bls) and the depth to bedrock on Sand Mountain ranges from 0 to 38 ft bls. Weathering of the Conasauga Formation has produced an undulating bedrock surface where several feet of relief has developed over tens of feet in some areas of the site (Figure 2-8).

2.4 SOILS

2.4.1 Facility-Wide Soils

Residual soil from weathered Conasauga Formation limestone overlies the majority of the Sloss Facility including the Land Disposal Areas; however, on and adjacent to Sand Mountain where SMWU 23 is located, residual soils have formed on the red Mountain Formation, the Ft. Payne Chert, the Tuscumbia Limestone, the Hartselle Sandstone, the Floyd Shale, and the Pottsville Formation (sandstone and shale) (Figure 2-6). According to the Soil Survey of Jefferson County, Alabama (Spivey, 1982), soils on Sand Mountain consist of Tupelo silt loam and Allen-Urban land complex. Tupelo silt loam is nearly level to gently sloping, moderately well drained soil located on uplands of limestone valleys. The Allen-Urban land complex consists of strongly sloping, well drained Allen fine sandy loam and areas of Urban land located on mountain foot slopes and uplands of limestone valleys. Urban soils, where the original soil was altered by cutting and filling, shaping and grading, excavation, blasting, compacting, or covering with concrete or asphalt, occur on the remainder of the Facility. Where the original soil has not been disturbed, residual soil from weathered Conasauga limestone is present.

Lithologic data collected during the FWI indicates that in general, native soils at the Sloss Facility consist of cohesive, medium stiff to stiff inorganic clays of low to medium plasticity (CL) and high plasticity (CH) with color ranging from reddish brown to orangish yellow to very pale orange. General engineering properties based on analytical and visual observations of site soil properties include: high shrink-swell potential, low permeability, and low strength capabilities. Laboratory analysis of nine shelby tubes collected during the FWI identified the following ranges for geotechnical parameters which are consistent with the general engineering properties identified for site soils: coefficient of permeability 1.9 x 10^{-6} to 5.4 x 10^{-8} centimeters per second (cm/sec); wet and dry porosity 0.59 to 0.84 and 0.39 to 0.55, respectively; wet and dry density 112.8 to 129.2 pounds per cubic feet (lb/ft^3) and 77.1 to 104.6 lb/ft^3, respectively; and specific gravity 2.70 to 2.81. The low permeability of native soils will act as a barrier to mitigate the downward migration of any constituents of concern

Soil thickness at the Sloss Facility ranges between 0 and 38 feet thick. The soil at SWMUs 38 and 39 ranges between 11 and 23 feet thick. On Sand Mountain, surrounding SWMU 23 soil thickness ranges from 0 to 38 feet thick. The soil is thickest on Sand Mountain in the area of monitor well MW-23 (38 ft), and thinnest, along the railroad tracks near piezometer P-20 and on Sand Mountain near monitor well MW-22. As indicated above, some areas of the Sloss Facility have been altered as a result of construction of the facility. Soils in the vicinity of SWMU 24 and SWMUs 38 and 39 have been replaced by non-native materials (eg. sludge, fill) in many locations.

2.4.2 Background Soil

Two areas located on Sand Mountain were selected as background soil boring locations in areas which appeared, according to historical aerial photographs, to be minimally disturbed by industrial activity. One area (SB-1, SB-2 and SB-3) was located south of Summit Street adjacent to power transmission lines where the grass is periodically maintained and the second area (SB-4, SB-5, SB-6) was located adjacent to the dirt road which trucks used to transport sludge to the Biological Sludge Disposal Area (SWMU 23) (Figure 2-8).

Background soil samples SB-1, SB-2, and SB-3 collected south of Summit Street consisted of a stiff, reddish-brown to yellowish-orange, clay (CH-CL) with minor black to yellowish orange mottling. Background soil samples SB-4, SB-5, and SB-6, collected upgradient of SWMU 23, consisted of a soft to stiff, yellowish-orange, clay to sandy clay (CL) with minor red mottling and chert fragments. A light brown, silty sand was encountered in the upper four feet of SB-4.

Background soil samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), Priority Pollutant (PP) metals, barium, and cyanide to evaluate background soil quality at the Sloss Facility. Analytical results are presented in Table 2-1. Trace concentrations of VOCs including methylene chloride, tetrachloroethene, toluene, 1,1,2-trichloroethene, and trichloroethene were detected in background soil borings at concentrations well below the USEPA Region III Industrial Risk-Based Concentrations (RBCs) for soil ingestion (USEPA, 1997a). These low concentrations of VOCs may be a result of vehicular traffic, industrial emissions, and weed maintenance. Tetrachloroethene, which degrades to trichloroethene, is used as a solvent and in soil sterilization, weed killers and insecticides.

Low concentrations of polycyclic aromatic hydrocarbons (PAHs) were detected in background soil borings at concentrations below USEPA Industrial RBCs for soil ingestion (Table 2-1). Additionally, bis(2-ethylhexyl)phthalate and di-n-butylphthalate were detected at concentrations below the USEPA Industrial RBCs for soil ingestion.

Concentrations of arsenic, beryllium, barium, chromium, copper, lead, nickel, thallium, zinc and mercury were detected in the background soil samples. Only arsenic and beryllium were detected at concentrations exceeding USEPA Industrial RBCs for soil ingestion (Table 2-1). The reported concentrations however are within the observed common range for trace elements in natural soils (USEPA, 1983).

2.5 HYDROGEOLOGY

2.5.1 Regional Hydrogeology

Most of the industrial and domestic water supply in the Birmingham area is provided by surface water sources. Groundwater resources in the Birmingham Valley are used to a limited degree for industry, manufacturing and ore extraction, and some municipal supply. Hydrogeologic units in the area which supply groundwater include the Conasauga Formation, the Ketona Dolomite, and the Knox Group, although younger Paleozoics are reported to be capable of producing sufficient quantities of water (Moffet and Moser, 1978).

The Conasauga Formation is a source of large quantities of water for wells and springs in some areas; however, the availability of water in the formation is not uniform because zones of increased porosity and permeability are concentrated along solution channels (Hunter and Moser, 1990). Recorded water production data reports yields up to 300 gallons per minute (gpm) for industrial wells and up to 3,400 gpm for springs in the Birmingham Valley. The well and spring (Tannehill Spring) with maximum reported yields are located approximately 3 and 26 miles, respectively, southwest of Sloss. In contrast, reported yields of wells completed in the vicinity of Tannehill Spring on the southwest edge of Jefferson County vary from having significantly more water than is normally required for one household to nonproducing (Moffet and Moser, 1978).

The porosity and permeability of the Conasauga Formation generally decreases with depth and most of the groundwater is contained within the upper 300 feet of the formation (Hunter and Moser, 1990). The water table in areas underlain by the Conasauga Formation is typically 5 to 30 ft bls.

The Ketona Dolomite may be also be a productive aquifer in areas where bedrock weathering has created secondary solution features, however, water-level and production data for this aquifer are lacking. The Copper Ridge member of the Knox Group is a productive aquifer with reported yields of 145 to 820 gpm in wells and up to 3,900 gpm in springs. Water levels in the Copper Ridge aquifer range from 20 to 75 ft bls.

There is no data regarding the vertical or horizontal hydraulic relationship between aquifers. Although the Conasauga Formation, Ketona Formation, and the Copper Ridge member of the Knob Group have been recognized as good aquifers, data regarding their aquifer characteristics in the area are lacking.

2.5.2 Facility Hydrology

The principal lithologic units underlying most of the Sloss Facility, including Land Disposal Areas SWMU 24 and SWMUs 38 and 39, are the overburden and the Conasauga Limestone (Figure 2-6). Based upon data collected during the FWI, groundwater flow in the Conasauga Formation is controlled by the occurrence and relationships between fractures, joints, and bedding of the limestone and the shale of the Conasauga Formation. Piezometer data collected during the Facility-Wide RFI indicate three potential water bearing zones occur in the Conasauga Formation: (1) the upper bedrock surface (top two to three feet) which is composed of highly weathered broken, limestone; (2) calcite filled fracture zones within the limestone ranging from approximately 40 to 140 ft bls; and (3) shaly zones below approximately 140 ft bls.

Several other hydrogeologic units underlie a small portion of the Facility on and adjacent to Sand Mountain in the Land Disposal Areas SWMU 23 area and the BTF area (Figure 2-6). On Sand Mountain, in the SWMU 23 area, water bearing zones are present in the Tuscumbia Limestone and in sandstone lenses within the Parkwood Formation (Figure 2-3).

The highest producing water bearing zones in the Conasauga Formation were encountered in the upper, weathered bedrock between 40 and 140 ft bls. Below 140 ft bls, the Conasauga Formation appears to be composed of massive beds of low permeability limestone with occasional relatively more permeable shaley zones and very few fractures. Water bearing zones below 140 ft bls for the most part have produced piezometers with low yields and slow groundwater recovery.

Although three water bearing zones exist in the Conasauga Formation, current water level data and the absence of a confining unit between zones suggests that the three zones are hydraulically connected. Additionally, water level data indicates the upper highly weathered limestone surface appears hydraulically connected to the overlying soil in many areas. Monthly water level data was collected from initiation of the FWI (August 1995) until December 1996 to assess the hydraulic connection between the shallow and deep (below 140 ft bls) Conasauga Formation. Based on an evaluation of the monthly water level data, it was determined that quarterly water level data would be adequate to assess the hydraulic connection between the shallow and deep Conasauga Formation. Quarterly water level data was collected beginning in January 1997.

During the Land Disposal Areas investigation, water levels were measured in all bedrock piezometers and monitor wells on August 17, 1997 (Table 2-2). Water level elevations in bedrock piezometers and monitor wells screened in permeable bedrock units shallower than 140 ft bls ranged from 506.02 ft amsl at P-1D to 603.90 ft amsl at MW-23 (Figure 2-9). Water level elevations in piezometers and monitor wells screened within the deep Conasauga Formation (depths greater than 140 ft bls), excluding MW-34D, ranged from 405.68 ft amsl at P-9 to 503.05 ft amsl at P-20 (Table 2-2 and Figure 2-10). The water level elevation in monitor well MW-34D is similar to water level elevations in the shallower piezometers and monitor wells.

Deep Conasauga Formation piezometers P-9, P-13D, and P-21 and monitor wells MW-26 and MW-34D bailed dry during well development and MW-26 and MW-34D also bailed dry during purging before groundwater sampling. Although monitor well MW-34D bailed dry during development, the water level in this monitor well recovered shortly after the well was developed and has a water level similar to piezometers and monitor wells set in the upper part of the Conasauga Formation. This suggests a hydraulic connection at this location between the three lithologic units described previously. Water levels in deep piezometers P-13D, P-20, and P-21, and monitor well MW-26 have recovered from 50 to 100 feet since development in August 1995 and indicate the deep zone is generally in hydraulic connection with the shallow, more permeable zone of the Conasauga Formation. Water levels in piezometer P-9, however, have not recovered since development and indicate some portions of the less permeable Conasauga Formation are not connected with the more permeable shallow zone and little to no groundwater flow may occur in these areas.

The shallow potentiometric map for August 1997 indicates that the groundwater flow direction in the upper Conasauga Formation beneath the Sloss Facility is generally to the northeast toward Five Mile Creek, a discharge area for the upper Conasauga Formation (Figure 2-9). Because of the change in topography on Sand Mountain north of Summit Street, the groundwater flow from Sand Mountain, which is a recharge area, is to the east toward the Polishing Pond. The deep potentiometric map for August 1997 indicates that the groundwater flow direction in the deep Conasauga is northeast in the Coke Manufacturing Plant area and to the south in the Land Disposal Areas (Figure 2-10).

The hydraulic conductivity in the Conasauga Formation aquifer system is variable, depending in part on the occurrence of interconnected fractures and weathered limestone zones. Values for hydraulic conductivity in the Conasauga Formation typically have an order of magnitude of 10^{-4} cm/sec (geometric mean), though values range from 7 x 10^{-2} (MW-29) to 4 x 10^{-8} cm/sec (P-4). Values for hydraulic conductivity in the Conasauga Formation in the area of the Land Disposal Areas SWMUs range from 7 x 10^{-2} (MW-29) to 4 x 10^{-8} cm/sec (MW-35) (Table 2-3).

The rate of groundwater flow in the bedrock aquifer varies locally with permeability and hydraulic gradient. In the southwestern section of the Facility, a relatively flat potentiometric surface with a hydraulic gradient of 0.010 feet per foot (ft/ft). In the central and northeastern portions of the Facility where the topography dips gently to the north, the hydraulic gradient is 0.025 ft/ft. Along the northwestern boundary of the Facility where Sand Mountain rises steeply a hydraulic gradient of 0.10 ft/ft was calculated. Groundwater flow velocities in the shallow Conasauga Formation, calculated from slug test results, hydraulic gradients, and aquifer properties generated during the FWI and Land Disposal Areas Investigation, may range from 0.07 feet per year (ft/yr) to 9,000 ft/yr.

2.6 LAND DISPOSAL AREAS (SWMUS 23, 24, 38, AND 39)

2.6.1 Biological Sludge Disposal Area (SWMU 23)

2.6.1.1 Description of History and Current Conditions

The Biological Sludge Disposal Area (SWMU 23) is located at the northwest part of the Sloss Facility on Sand Mountain (Figure 1-2). Sludge from the BTF Dewatering Machine (SWMU 20) and the Chemical Manufacturing Plant Benzenesulfonyl Chloride Wastewater Neutralization System (SWMU 34) was disposed on this two-acre site that is bounded by soil dikes. The unit began receiving waste in 1975 and received approximately 12 tons of sludge a day until April 1990 when the neutralization process which generated the sludge at SWMU 34 was discontinued. The unit continued receiving approximately 10 tons of biological sludge a day from the BTF until 1993 when all disposal in this unit was discontinued. While in operation, the unit was covered approximately once every 45 days. Currently the sludge generated at the BTF is transported to Beltona where it is used as a soil amendment in previously mined areas.

2.6.1.2 Previous Investigations

In February 1986, USEPA reportedly collected sludge samples from the BTF dewatering machine (filter press) which was the major source of sludge disposed in SWMU 23 (USEPA, 1989a). The analytical results indicated the following constituents and concentrations:

Constituent	Concentration
Arsenic	130 milligrams per kilogram (mg/kg)
Chromium	120 mg/kg
Cyanide	20 mg/kg
Lead	130 mg/kg
SVOCs	42,000,000 micrograms per kilogram (ug/kg)
VOCs	12,000 ug/kg

The RFA report recommended that a RFI should be conducted to evaluate the impact of the unit on groundwater, surface-water, soil, and air quality.

2.6.2 Blast Furnace Emission Control Sludge Waste Pile (SWMUs 24 and 39)

2.6.2.1 Description of History and Current Conditions

There are two Blast Furnace Emission Control Sludge Waste Piles located at the Sloss Facility. The piles contain dusky brown granular material that was generated during the production of pig iron from 1958 to 1979. The sludge that was produced at the Blast Furnace Plant was transported to a waste pile adjacent to SWMU 39 or the BTF (Figure 1-2). The material was formerly a listed USEPA Hazardous Waste (Code F016) because of its cyanide content but was removed from 40 Code of Federal Regulation (CFR) 261 by the November 12, 1980 Federal Register (Volume 45, No. 220).

The waste pile at SWMU 24 occupies several acres adjacent to the BTF. The material is currently being removed from SWMU 24 and being sold as product. As a result of mining the waste pile at SWMU 24, the footprint of this SWMU has increased. The waste pile at SWMU 39 is a northeast-southwest trending ridge that is adjacent to SWMU 38. Both SWMUs are partially vegetated and lack liners or runoff/runon controls.

2.6.2.2 Previous Investigations

In February 1986, the Environmental Service Division (ESD) of the USEPA collected sludge samples from SWMU 24 as part of a waste stream investigation. Analytical reports indicated that several metals and cyanide were detected. Chromium, lead, and zinc had the highest concentrations. During the site investigation, ESD reported that surface water drains off SWMU 24 and flows into SWMU 22.

2.6.3 Landfill (SWMU 38)

2.6.3.1 Description of History and Current Conditions

The Landfill is located at the north-central part of the Sloss Facility, adjacent to the Blast Furnace Waste Pile (SWMU 39). The pile is a northeast-southwest trending ridge, approximately 60 feet high, which began operation in the 1920s. Debris identified at the Landfill include concrete rubble, conveyor belts, wood, construction material, empty 55-gallon drums, flue dust, and coal. The landfill is still used for disposal of uncontaminated concrete, brick, block, and soil from excavation activities. The landfill was subjected to a metals recovery operation over the last two years.

2.6.3.2 Previous Investigations

In October 1980, an evaluation of the Landfill was conducted by the Environmental Division of the Geological Survey of Alabama. The evaluation identified the disposed material as mineral fiber slag, tar trap residue, decanter tank tar, flue dust, and construction debris. The evaluation recommended disposal practices should cease and continue at a new location.

The 1989 RFA reported that the unit was not capped and had no containment controls. The USEPA recommended that monitor wells be installed and groundwater samples should be collected to determine groundwater quality.

3.0 DESCRIPTION OF INVESTIGATIVE TASKS

3.1 SURFICIAL SOIL SAMPLING

A total of fifteen (15) surficial soil samples were collected around the perimeter of SWMU 24 at sample locations 24-SL0002 through 24-SL0016. Surficial soil sample locations at SWMU 24 are shown on Figure 3-1 and the location names and sample identification numbers area summarized in Table 3-1. The purpose of the soil sampling and analysis was to determine if site soil has been impacted by the SWMU 24 sludge. Although sixteen (16) surficial soil samples were proposed in the RFI Work Plan, the number of sampling locations was reduced based on site conditions identified during the field reconnaissance. Soil was not present at or adjacent to the proposed 24-SL0001 location, only sludge was present, therefore this sampling location was eliminated from the sampling program. Copies of the surficial soil sampling logs are included in Appendix A.1. A sample designation explanation is provided in Volume III, Analytical Data, of the RFI Land Disposal Areas Report.

Surficial soil sampling was conducted in accordance with the procedures specified in the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP). Samples were collected via a stainless steel hand auger after clearing the ground surface of the sludge material. The stainless steel hand auger was advanced to one foot below the top of the soil. To prevent volatilization, samples for volatile organic analysis were immediately placed in four-ounce jars and put in a cooler containing ice. Samples collected for all other analysis were mixed in a stainless steel mixing bowl using a stainless steel spoon. The soil was scraped from the sides and rolled to the middle of the bowl and initially mixed. The sample was then quartered and each quarter was mixed individually. The quarters were recombined into the center of the bowl and mixed one final time. The sample was then spooned into four-ounce glass jars with Teflon™ lined caps. The sample containers were placed in a cooler containing ice.

Duplicates, equipment blanks and field blanks were collected according to the frequency and procedures specified in the site QAPP. Duplicate samples were collected by transferring soil from the stainless steel bowl into the duplicate and field sample containers in equal portions until the containers were full. The duplicate samples collected at SWMU 24 are presented in Table 3-1. The sampling equipment was decontaminated in accordance with the site-specific QAPP.

The soil samples were preserved with ice and relinquished either to a courier for delivery or delivered by G&M sampling personnel to Analytical Services Incorporated (ASI). Soil samples were analyzed for USEPA Method 8270B (SVOCs) and USEPA Method 8260A (VOCs), the thirteen PP metals, barium, and cyanide. Analytical reports for the soil samples are presented in Volume III, Analytical Data, of the RFI Land Disposal Areas Report. After completion of the sampling and analysis program, the field and analytical data were reviewed and validated according to procedures outlined in the site QAPP. The checklists completed during the data validation are included in Volume III, Analytical Data, of the RFI Land Disposal Areas Report.

3.2 SLUDGE SAMPLING

Sludge samples from SWMUs 23, 24, and 39 were collected from June 16 to 19, 1997. The sludge sample location names and sample identification numbers are summarized on Table 3-2. Sludge samples were collected at four (4) locations at SWMU 23 (23-SM0001 through 23-SM0004) and at SWMU 24 (24-SM0001 through 24-SM0004). The sludge sample locations for SWMUs 23 and 24 are shown on Figures 3-2 and 3-1, respectively. Sludge samples were collected at six (6) locations (39-SM0001 through 39-SM0006) at SWMU 39. However, as specified in the work plan, only four of the sludge samples collected from SWMU 39 were analyzed by ASI. The locations of the four sludge samples (39-SM0002, 39-SM0003, 39-SM0005, and 39-SM0006) analyzed by ASI are shown on Figure 3-3. Copies of the sludge sampling logs are included in

Appendix A.2. A sample designation explanation is provided in Volume III, Analytical Data, of the RFI Land Disposal Areas Report.

Sludge sampling was conducted in accordance with the procedures specified in the FSP and QAPP. Samples were collected by scooping sludge from select areas of the waste piles using a stainless steel spoon after removing weathered material at surface. To prevent volatilization, samples for volatile organic analysis were immediately placed in four-ounce jars and put in a cooler containing ice. Samples collected for all other analysis were mixed in a stainless steel mixing bowl using a stainless steel spoon. Sample mixing followed procedures discussed in Section 3.1. The sample was then spooned into four-ounce and one-liter, wide-mouth glass jars with Teflon™ lined caps. The sample containers were placed in a cooler containing ice.

Duplicates, equipment blanks and field blanks were collected according to the frequency and procedures specified in the site QAPP. Duplicate samples were collected by transferring sludge from the stainless steel bowl into the duplicate and field sample containers in equal portions until the containers were full. The duplicate samples collected are presented in Table 3-2. The sampling equipment was decontaminated in accordance with the site-specific QAPP.

The sludge samples were preserved with ice and relinquished either to a courier for delivery or delivered by G&M sampling personnel to ASI. Sludge samples were analyzed for USEPA Method 8270B (SVOCs) and USEPA Method 8260A (VOCs), the thirteen PP metals, barium, cyanide, and Toxicity Characteristic Leaching Procedure (TCLP) constituents. Analytical reports for the sludge samples are presented in Volume III, Analytical Data, of the RFI Land Disposal Areas Report. After completion of the sampling and analysis program, the field and analytical data were reviewed and validated according to procedures outlined in the site QAPP. The checklists completed during the data validation are included in Volume III, Analytical Data, of the RFI Land Disposal Areas Report.

3.3 GEOPHYSICAL INVESTIGATION

The RFI Work Plan proposed collection of seismic and terrain conductivity surveys data around the SWMU 23 and SWMUs 38 and 39; however, changes to the geophysical survey were proposed in a letter to the USEPA dated May 12, 1997. Proposed changes included elimination of the seismic survey during the Land Disposal Areas investigation because seismic survey and geologic mapping data generated during the FWI provided adequate bedrock topography data. Seismic data collected during the FWI pertinent to SWMU 23 and SWMUs 38 and 39 are presented in this report.

The letter also proposed that grounded resistivity measurements be taken on the western side of SWMUs 38 and 39 to minimize the effect of the railroad tracks and cars on the results. During the field investigation, additional changes based on field conditions included collection of EM-31 data around SWMU 23 and SWMUs 38 and 39 to provide geophysical data to 18 ft bls and collection of ground resistivity data around SWMUs 38 and 39 to minimize the effect of buried and overhead powerlines and overhead and buried pipelines. Proper electrode spacing for ground resistivity readings were determined in the field by the Senior Field Geophysicist using two Schlumberger soundings.

3.3.1 <u>Perimeter Conductivity and Resistivity Surveys</u>

Perimeter conductivity and/or resistivity surveys around SWMU 23 and SWMUs 38 and 39 were conducted from July 7 to July 14, 1997 at the Sloss Facility to locate anomalous areas of relatively high conductivities in soil and groundwater. Geophysical and geologic data were used to determine if anomalous conductive regions were derived from landfill materials (*i.e.* leachate). EM-31 and EM-34 readings were collected around SWMU 23 at 5 and 25 foot spacings, respectively, and the geophysical investigation line is shown on Figure 3-2. EM-31 and ground resistivity readings were collected around SWMUs 38 and 39 at 5 and 25 foot spacings, respectively, and the geophysical investigation line is shown on Figure 3-3.

Labeled pin flags were placed along the geophysical investigation lines. These lines were later surveyed and the coordinates used to present the conductivity and resistivity data. The conductivity and resistivity data interpretation process are discussed in Appendix B.

3.3.2 Seismic Survey

A perimeter seismic survey was conducted around the Sloss Facility from June 5 to June 20, 1995 during the FWI to provide a preliminary identification of the bedrock surface and to develop a conceptual hydrogeologic model. A total of 47 seismic spreads were placed around the perimeter of the Sloss Facility at the locations presented in Figure 3-4. Seismic data was collected along the eastern boundary of SWMU 23 (seismic lines S40 and S41) and along the eastern and western boundary of SWMUs 38 and 39 (seismic lines S5, S6, S26 though S29, S34, and S35).

A Strata View™ 48 channel seismic recorder manufactured by Geometrics of California was used for the survey. Vertical component geophones with a natural frequency of 40 hertz (Hz) were used to sense seismic vibrations. The spacing between the geophones was 5 feet, giving a spread length of 235 feet. This spread length did not allow for continuous site coverage of the Sloss Facility perimeter which was proposed in the RFI Work Plan; however, it was the Senior Field Geophysicist's assessment that the new density of data would provide a good statistical evaluation of the bedrock topography of the site.

A 15 pound sledge hammer was used as an energy source by hitting a metal base plate placed on the ground surface. By stacking the results from several hammer blows on the base plate at each shot location, this setup produced good quality seismic data.

Shots were placed at the ends of the seismic spread along with three shots placed approximately equally spaced within the spread. On some of the spreads, shots were also placed 50 feet beyond the ends of the spread. However, in all cases, depths and velocities are interpreted only from within the spread length.

At each of the shot locations a labeled pin flag was placed. These shot points were later surveyed and the coordinates used to present the seismic data. Further details on the seismic survey and data interpretation process are discussed in Section 2.7 and Appendix E of the RFI Facility-Wide Report.

3.4 SUBSURFACE SOIL SAMPLING

Subsurface soil samples were collected at Land Disposal Areas SWMU 23 and SWMUs 38 and 39 at the locations of the monitor wells. Soil samples were collected during installation of new monitor wells MW-21, MW-29, MW-33, MW-35, MW-37 in August 1997. Chemical analysis was not performed on soils from monitor well MW-31 because soil was not present above the bedrock surface.

As proposed in a letter to USEPA dated May 12, 1997, several piezometers installed during the FWI, which coincided with proposed monitor well locations for SWMU 23 and SWMUs 38 and 39, were converted to monitor wells (Table 2-2). The FWI piezometers were constructed in accordance with the monitor well specifications presented in the RFI Work Plan. At monitor wells MW-22 through MW-28, MW-30, MW-32, MW-34, and MW-36 soil borings were drilled adjacent to the existing monitor wells to collect subsurface soil samples (Table 3-3). Lithologic data collected during installation of these monitor wells in 1995 was used to select the subsurface sample intervals for laboratory analysis. Chemical analysis was not performed on soils from the soil boring adjacent to MW-32 because soil was not present above the bedrock surface.

A total of 29 soil samples were collected at 15 monitor well locations for chemical analysis (Table 3-3). Sample collection and laboratory analyses were conducted in accordance with the procedures and methods described in the site FSP and QAPP. The soil samples were field screened to determine the concentration of volatile organic vapors, using an Organic Vapor Monitor (OVM) equipped with a Photo Ionization Detector (PID). A sample designation explanation is provided in Volume III, Analytical Data, of the RFI Land Disposal Areas Report.

Detailed soil sample logs were prepared for each subsurface soil sample using the Unified Soil Classification System (USCS). Copies of the subsurface soil sampling logs are presented in Appendix A.3. The drilling and sampling equipment were decontaminated in accordance with the site QAPP.

Subsurface soil samples were collected using a truck mounted hollow stem auger drill rig. Continuous formation samples were collected from boreholes for monitor wells MW-21, MW-29, MW-31, MW-33, MW-35, MW-37 at 2-foot intervals using split spoon samplers in accordance with American Society Testing Materials (ASTM) Method D-1586. At the locations where piezometers were converted to monitor wells, soil borings were drilled adjacent to the existing monitor wells and the split spoon sampling intervals were selected using depth requirements specified in the RFI Work Plan and existing lithologic data. The standard split spoon used was two inches in diameter and two feet in length, providing a discrete sample of the two-foot interval. The split spoon was attached to the end of the drilling rod and driven into the soil the length of the sampler. After reaching the desired depth, the split spoon was withdrawn from the borehole, detached from the drilling rod, and opened. The upper portion of the split spoon was discarded.

At each borehole, subsurface samples were collected for chemical analysis in the middle of the soil column (1/2 the distance between the surface and the top of bedrock) and just above the top of bedrock surface. In some boreholes, fill or sludge materials comprised a significant portion of the material above the top of bedrock surface and soil samples for chemical analyses were not collected from one or both of the proposed collection depths. If the soil thickness was less than five feet, one sample was collected just above the bedrock surface. Similarly, if the soil thickness was less than one-half foot, soil samples for chemical analyses were not collected due to the inability to acquire sufficient sample volume using the split spoon sampler (MW-31 and MW-32).

To prevent volatilization, soil from each sample interval was collected for VOC analysis by transferring the soil directly from the sampling instrument to the appropriate sample container immediately after the split spoon was opened. The VOC samples were then placed in a cooler with ice. The remaining soil was mixed for semivolatile and metals analysis. Sample mixing followed procedures discussed in Section 3.1. After the mixing was complete, the sample was then spooned into wide-mouth glass jars with Teflon™ lined caps.

Some of the soil samples had a high clay content. In clayey soils, mixing the samples according to the standard procedures was not possible. In these cases, the sample was placed in the bowl and finely subdivided with a stainless-steel spoon. Representative portions of the subdivided sample were then distributed to appropriate sample containers.

Duplicates, equipment blanks and field blanks were collected according to the frequency and procedures specified in the site QAPP. Duplicate soil samples for semivolatile and metals analysis were collected by transferring soil from the stainless steel bowl into the appropriate containers in equal portions until the containers were full. In clayey soils, each duplicate container was filled with equally representative soil portions. Duplicate samples collected are presented in Table 3-3.

Soil samples were preserved with ice and relinquished to a courier for overnight delivery service to ASI in Atlanta, Georgia for USEPA Method 8260A (VOCs), USEPA Method 8270B (SVOCs), the thirteen PP metals, barium, and cyanide analysis.

Drill cuttings generated at SWMUs 23, 38 and 39 soil sample locations were containerized in Department of Transportation (DOT)-approved 55 gallon drums, labeled, and stored in a central staging area. Soil results were used to characterize investigation derived waste (IDW) soil, except at MW-31 and MW-32 where soil samples were not collected. At these locations, samples of drummed soil cuttings were collected and analyzed for USEPA Method 8260A, USEPA Method 8270B, PP metals, barium, and cyanide. Characterization of the IDW soil and disposal recommendations are presented in Volume II, Investigation Derived Waste Report, of the Land Disposal Areas RFI Report. Boreholes which were not converted to monitor wells, were abandoned by filling the bore hole with a 3% bentonite mixture neat cement grout.

Analytical reports for the soil samples and IDW samples are presented in Volume III, Analytical Data, of the RFI Land Disposal Areas Report. After completion of the sampling and analysis program, the field and analytical data were reviewed and validated according to the procedures outlined in the site QAPP. The checklists completed during the data validation are included in Volume III, Analytical Data, of the RFI Land Disposal Areas Report.

The intervals sampled at each location, and the methodology used to select the sample intervals is discussed below in SWMU specific sections.

3.4.1 SWMU 23

Subsurface soil samples were collected from the five monitor well locations at SWMU 23 (Table 3-3, Figure 3-2). Soil samples were collected at the location of newly installed monitor well MW-21 and previously installed monitor wells MW-22, MW-23, MW-24 and MW-25S/MW-25D. The proposed locations of monitor wells MW-22, MW-23, MW-24, and MW-25S/MW25D coincided with FWI piezometers P-31, P-30, P-29, and P-28S/P-28D, respectively, and these piezometers have been converted into monitor wells. Soil borings 23-SBMW22, 23-SBMW23, 23-SBMW24, and 23-SBMW25, respectively, were drilled adjacent to the existing monitor wells to collect subsurface soil samples (Table 3-3).

Subsurface soil samples were collected at mid-depth and just above the bedrock surface at the borehole for monitor well MW-21 and from soil borings 23-SBMW23 and 23-SBMW24. The location names, sample identification numbers, and sample intervals for the subsurface soil samples are presented in Table 3-3. Only one subsurface soil sample, 970806-LD-23-SL00022(0-2), was collected from a soil boring 23-SBMW22 since the bedrock surface was observed at 2 ft bls during installation of this well. A single soil sample, 970805-LD-23-SL0025(19-21),was collected just above the bedrock surface in soil boring 23-SBMW25 due to the presence of a significant thickness of sludge and lime used for stabilization of biological sludge at this location.

3.4.2 SWMUs 38 and 39

Subsurface soil samples were collected from ten of the 12 monitor well locations at SWMUs 38 and 39 (Figure 3-3). In the vicinity of SWMU 38, soil samples were collected from six monitor well locations. Soil samples were collected at the location of newly installed monitor wells MW-29 and MW-37 and previously installed monitor wells MW-26, MW-27, MW-28, and MW-30S/MW-30D. Soil samples could not be collected at newly installed monitor well MW-31 since less than one-half foot of native soil was present at this location. The proposed locations of monitor wells MW-26, MW-27, MW-28, and MW-30S/MW30D coincided with the locations of FWI piezometers P-27, P-26, P-25, and P-24S/P-24D, respectively, and these piezometers have been converted into monitor wells (Table 2-2). Soil borings 38-SBMW26, 38-SBMW27, 38-SBMW28, and 38-SBMW30, respectively, were drilled adjacent to the existing monitor wells to collect subsurface soil samples (Table 3-3).

Subsurface soil samples were collected at mid-depth and just above the bedrock surface from the boreholes for newly installed monitor wells MW-29 and MW-37 and from soil borings 38-SBMW26, 38-SBMW27, 38-SBMW28, and 38-SBMW30. The location names, sample identification numbers, and sample intervals for the subsurface soil samples are presented in Table 3-3. Soil sample 970808-LD-38-SL0027(22-24)was collected from a second borehole installed adjacent to monitor well MW-27 to replace the 970805-LD-38-SL-0027(22-24) VOC sample which was broken during shipment.

In the SWMU 39 area, subsurface soil samples were collected from four locations (Table 3-3, Figure 3-2). Soil samples were collected at the location of newly installed monitor wells MW-33 and MW-35 and previously installed monitor wells MW-34S/MW-34D and MW-36. Since soil was not present above the bedrock surface at previously installed monitor wells MW-32, soil samples were not collected. The proposed locations of monitor wells MW-32, MW-34S/MW-34D, and MW-36 coincided with the locations of FWI piezometers P-7, P-6S/P-6D, and P-5, respectively, and these piezometers have been converted into monitor wells (Table 2-2). Soil borings 39-SBMW32, 39-SBMW34 and 39-SBMW36 were installed adjacent to these monitor wells to collect the subsurface soil data.

Only one soil sample was collected from the boreholes for monitor wells MW-33 and MW-35 and from soil boring 39-SBMW34 since less than 5 feet of native soil material was present above the bedrock surface at each location. Subsurface soil samples were collected at mid-depth and just above the bedrock surface from soil boring 39-SBMW36. The location names, sample identification numbers, and sample intervals for the subsurface soil samples are presented in Table 3-3. Soil sample 9708008-LD-39-SL0034(10-12)was collected from a second borehole installed between existing monitor wells MW-34S and MW-34D for collection of soil samples to replace the 970805-LD-38-SL-0034(10-12)VOC sample which was broken during shipment.

3.5 MONITOR WELL INSTALLATION

At SWMU 23, the approved RFI Work Plan indicated a total of 8 monitor wells would be installed; however, six monitor wells were installed. Since five of the proposed monitor well locations coincided with FWI piezometer locations and the piezometers were constructed in accordance with monitor well construction specifications detailed in the work plan, these five piezometers are being utilized as monitor wells. At SWMU 23, piezometers P-28S, P-28D, P-29, P-30, and P-31 were converted to monitor wells MW-25S, MW-25D, MW-24, MW-23, and MW-22, respectively. New monitor well MW-21 was installed in 1997 during the Land Disposal Areas RFI. Proposed monitor well MW-20 was not installed because SWMU 23 does not extend as far down Sand Mountain as originally depicted in the work plan. Additionally, the proposed deep monitor well at the MW-23 location was eliminated because a deeper monitor well was not warranted since MW-23 is 78.5 ft deep. These modifications to the scope of work were proposed in a letter dated May 12, 1997 to the USEPA.

At SWMUs 38 and 39, the approved RFI Work Plan indicated a total of 12 monitor wells would be installed; however, 14 wells were installed. Since seven of the proposed monitor well locations coincided with FWI piezometer locations and the piezometers were constructed in accordance with monitor well construction specifications detailed in the work plan, these seven piezometers are being utilized as monitor wells. At SWMUs 38 and 39, piezometers P-5, P-6S, P-6D, P-7, P-27, P-26, P-25, P-24S, and P-24D were converted to monitor wells MW-36, MW-34S, MW-34D, MW-32, MW-26, MW-27, MW-28, MW-30S, and MW-30D, respectively (Table 2-2). Although monitor well couplets were not proposed in the work plan at MW-34 and MW-30, piezometer couplets had been installed at these locations during the FWI and the deeper wells (MW-34D and MW-30D) in the couplet are being utilized in the SWMUs 38 and 39 investigation. Five new shallow bedrock monitor wells MW-29, MW-31, MW-33, MW-35, and MW-37 were installed during the 1997 Land Disposal Areas investigation.

3.5.1 Installation Methods

The monitor wells which were installed during the Land Disposal Areas RFI and monitor wells which were initially installed as FWI piezometers were installed in the first water bearing zone encountered during drilling. Information from the monitor wells will assist in characterizing the site geology, hydraulic gradients, groundwater flow rates, flow direction, and groundwater quality in the Land Disposal Areas SWMUs. Construction details for the monitor wells in the Land Disposal Areas are included in Table 2-2. Both the monitor wells which were installed during the Land Disposal Areas RFI and monitor wells which were initially installed as FWI piezometers were installed using the following procedures.

Two drill rigs and two different methods of drilling were utilized to drill the boreholes for the monitor wells. First, a hollow stem auger drill rig was used for drilling in the unconsolidated residuum and collecting split spoon samples. After the auger rig encountered bedrock or auger refusal, down-hole percussion hammer drilling was used to complete the monitor well borehole in bedrock. A decontamination pad for decontamination of drilling equipment was constructed using visquene on a bermed, concrete pad near the Chemical Manufacturing Plant. All drilling and sampling equipment was decontaminated in accordance with the QAPP.

The hollow stem auger drill rig, using 3.25 inner diameter (I.D.) augers, was used to drill a nominal 7.25 inch pilot hole through the overburden sediments to auger refusal. At the monitor well locations, 2-foot split spoon formation samples were collected continuously from the land surface to the top of bedrock. The split spoon sampling was performed in accordance with ASTM Method D-1586. After the split spoon was opened, the samples were field screened to determine the concentration of volatile organic vapors, using an OVM equipped with a PID. The physical characteristics of the samples obtained were described in detailed soil boring logs using the USCS. Copies of the soil boring logs for the newly installed and the monitor wells installed during the FWI are provided in Appendix A.4. After the soil was characterized, soil samples were archived in labeled, air-tight glass containers.

During the hollow stem auger drilling, the subsurface conditions at each location were evaluated to determine if a surface casing was needed. If a possible source of contamination was suspected to be near the monitor well, a 6-inch diameter steel surface casing was installed through the overburden into the bedrock surface. If a surface casing was required, the existing 7.25-inch borehole was reamed to be a nominal 10-inch diameter borehole using the air rotary method of drilling. Air was used as the circulating media during drilling to clear the borehole of cuttings. The air from the compressor on the rig was filtered using in-line and external filters to prevent oil from the compressor from being introduced into the borehole. A small volume of potable water was occasionally used during drilling to assist in the removal of drill cuttings. The borehole was advanced approximately two feet into the bedrock surface, however, if the bedrock surface was highly fractured or weathered, the borehole was advanced until more competent rock was encountered.

After removal of the drill bit, a 6-inch steel surface casing was installed to the total depth of the borehole. Permanent 6-inch surface casing was installed at monitor wells MW-31, MW-33, MW-35, and MW-37 installed during the Land Disposal Areas investigation and MW-25S, MW-25D, MW-26, MW-27, MW-32, MW-34S, and MW-34D and MW-36 installed during the FWI. The annular space was then sealed with neat cement grout by pressure grouting with a tremie pipe from the bottom of the hole to land surface. The cement grout consisted of a mixture of Portland Type I cement (ASTM Method C-150) and water in a proportion that did not exceed seven gallons of potable water per bag of cement (94 pounds). Additionally, 3 percent by weight of bentonite was added to the grout to prevent shrinking and to control the heat of hydration during grouting.

If there were no adjacent sources of possible contamination, but the overburden was unstable allowing for possible cave-in during drilling, a temporary 6-inch steel surface casing was installed. A nominal 9-inch borehole was advanced through the overburden using the air rotary method of drilling. The borehole was drilled approximately 2 feet into the bedrock surface, or until competent bedrock was encountered. After the drill bit was removed, a 6-inch steel surface casing was installed to the total depth of the borehole. A bentonite seal, approximately 2- to 3-feet thick, was placed around the bottom of the surface casing where it was seated in the bedrock. The annular space at the land surface was sealed off with visquene to prevent rock cuttings from falling into the annular space during drilling. The remaining annular space was left open. A temporary surface casing was installed at monitor well MW-29 during the Land Disposal Areas investigation and MW-24S, MW-24D, and MW-28 during the FWI. Following completion of the well, the temporary surface casing was removed.

After allowing the surface casing grout to set or bentonite in the case of a temporary surface casing, a nominal 6-inch diameter borehole was drilled inside the surface casing by down-hole percussion hammer drilling. Air was used as the circulating media during drilling to clear the borehole of cuttings. The screened intervals of the monitor wells were selected so that completed monitor wells would provide representative hydrologic information for the water bearing zone. The boreholes were advanced in bedrock until the drill cuttings were damp or wet and the borehole appeared to produce sufficient water for a monitor well.

The bedrock monitor wells were constructed using 10 feet of new, 2-inch-diameter, factory slotted, 0.010-inch slot polyvinyl chloride (PVC) screen with schedule 40, threaded, flush joint, PVC casing extending to land surface. A schematic diagram of a typical bedrock monitor well is shown in Figure 3-5. The PVC casings conformed to the requirements of ASTM Method D-1785 and carried the seal of the National Sanitation Foundation. A section of closed end, schedule 40 PVC casing was attached to the bottom of each screen to provide a sump for sediments. Each monitor well was fitted with a vented PVC cap.

The annular space between the borehole and the screen was filled with 20/30 graded silica sand from the bottom of the borehole to approximately 2 feet above the top of the well screen, either by gravity feeding the sand from the surface, or by using the tremie method.

A nominal 2-foot thick bentonite seal was placed above the filter pack in each piezometer to prevent the downward migration of cement grout. The seal, consisting of tamped bentonite pellets, was installed by gravity feeding from the surface and allowed to hydrate for a minimum of one hour. The remaining annular space above the bentonite was sealed by pressure grouting with neat cement grout through a tremie pipe to land surface. The cement grout consisted of a mixture of Portland Type I cement (ASTM Method C-150) and water in a proportion that did not exceed seven gallons of clean water per bag of cement (94 pound). Additionally, 3 percent by weight of bentonite powder was added to the grout to prevent shrinking and control the heat of hydration during grouting.

The boreholes were drilled as near to plumb as possible to assist in proper casing alignment, and placement of the sand pack and cement seal. The plumbness of each monitor well was checked by running a 6 ft length of 1.75-inch outer diameter (O.D.) PVC attached to clean polyethylene rope to the bottom of the monitor well. Monitor well casing plumbness was checked before and after grouting the annular space.

Drill cuttings from each borehole were containerized in DOT-approved 55-gallon drums and labeled with the well number, date, and site. In August 1997, IDW rock cuttings from monitor wells installed during the Land Disposal Areas investigation were sampled and analyzed for USEPA Method 8260A, USEPA Method 8270B, the thirteen PP metals, barium, and cyanide. Analytical reports for the IDW samples and the checklists completed during the data validation are presented in Volume III, Analytical Data, of the RFI Land Disposal Areas Report. Characterization of the IDW and recommendations for disposal are presented in Volume II, Investigation Derived Waste Report, of the RFI Land Disposal Areas Report. IDW drill cuttings from the monitor wells installed during the FWI were characterized in the RFI Facility-Wide Report.

Precautions were used during the drilling and monitor well construction to prevent the entry of foreign material into the well. Monitor well casings were set to extend to two to three ft above grade, and surrounded by a 4-inch diameter protective steel casing set into a concrete pad. The protective steel casings have locking caps. Each concrete pad has nominal dimensions of 3 ft x 3 ft x 4-inches and slopes away from the monitor well. A permanent metal plate was installed in each concrete pad and stamped with the monitor well identification number. In areas where monitor wells could possibly be damaged by vehicular traffic, 4-inch diameter steel protective posts were placed equally spaced around the monitor well. The number of protective posts used ranged from two to four posts. At one location (MW-33), six 6-inch steel posts were installed around the monitor well due to a high probability of the monitor well being damaged by heavy machinery. When installed, the protective posts were concreted into the ground to a depth of approximately two ft bls, and then the posts were filled with concrete.

The Geraghty & Miller representative prepared detailed monitor well construction and sample core logs for each monitor well. Copies of the field logs for the monitor wells installed during the Land Disposal Areas investigation and the FWI are included in Appendix A.5.

3.5.2 Well Development

After completion of each monitor well, but no sooner than 48 hours after grouting was completed, monitor well development was conducted. The monitor wells were developed by pumping and/or bailing. No acids or dispersing agents were used in any monitor well. Development continued until the pH, conductivity, and turbidity of the groundwater had stabilized, or until it was determined that further development would not provide any significant improvement in turbidity. The well yield for monitor wells MW-26, MW-34D, and MW-35, were too low to permit continuous pumping or bailing. This monitor well was initially pumped dry and allowed to recharge for 24 hours. After 24 hours, the volume of water in the monitor well casing was considered one recharge volume and the monitor well was repeatedly bailed dry until five recharge volumes were removed. Monitor well development logs are presented in Appendix A.6.

Development water was containerized in DOT-approved 55-gallon drums and labeled with the monitor well identification number, site location and date. Groundwater sampling results will be used to characterize IDW development water. Characterization of the IDW development water and disposal recommendations are presented in Volume II, Investigation Derived Waste Report, of the RFI Land Disposal Areas Report.

3.6 IN-SITU PERMEABILITY TESTING

In-situ permeability tests were performed on each of the installed monitor wells to determine the hydraulic conductivity of the formation around the screened portion of each well. In-situ permeability tests were conducted on the monitor wells installed during the Land Disposal Areas investigation in August 1997 and the monitor wells installed during the FWI in August 1995. The tests were performed by rapidly lowering a sealed, closed end, water filled PVC pipe (slug) into each monitor well, instantaneously displacing the water column from its initial static level. The water level in each monitor well was measured to 0.01-foot accuracy with a pressure transducer and an In-Situ Model SE 1000B Hermit data logger. The initial phase of the test is known as a falling head slug test. After the water level had equilibrated, less than 0.01 ft change over at least six minutes, the slug was quickly removed causing the water column to instantly fall and then begin to rise towards its static level. The falling head and rising head versus time data were analyzed to determine the hydraulic conductivity at each monitor well tests.

The accumulated data were transferred to an IBM Compatible PC from the data logger. Microsoft Excel™ software was used to organize, print, and graph the raw data.

The hydraulic conductivity was calculated using ARCADIS Geraghty & Miller, Inc. AQTESOLV™ software which solves for hydraulic conductivity using the method presented by Bouwer and Rice (1976). In general, data from the water-level displacement during the initial phase of infiltration and recovery were given a higher weight due to minimal sandpack effects, and the best-fit line was found for data points from the beginning of the test which represent steady-state recovery. Monitor well slug test logs and evaluations are presented in Appendix C for the new and previously installed monitor wells.

3.7 WATER LEVEL MEASUREMENTS

Water level measurements were collected on August 17, 1997 at all site piezometer locations and monitor wells in the Land Disposal Areas SWMUs using an electronic water rule (Appendix A.7). Table 2-2 summarizes water level data collected in August 1997. Additionally, surface water levels were measured at the staff gages in Five Mile Creek and the drainage ditch in August. The water level at staff gage SG-3 was not measured because it could not be located on August 17, 1997. The data obtained on August 17, 1997 was used to construct groundwater contour maps which were used to estimate flow patterns and gradients over the site. The electronic water rule was decontaminated prior to use at each piezometer and monitor well according to the procedures specified in the site QAPP.

3.8 GROUNDWATER SAMPLING

A total of twenty (20) monitor wells (MW-21 through MW-37) were sampled at SWMUs 23, 38, and 39. The purpose of the groundwater sampling and analysis was to determine if groundwater has been impacted by site activities. Copies of the groundwater sampling logs are included in Appendix A.8. A sample designation explanation is provided in Volume III, Analytical Data, of the RFI Land Disposal Areas Report.

Groundwater sampling was conducted in accordance with the procedures specified in the FSP and QAPP which are summarized below. After taking water level and total depth measurements using an electronic water rule at each well, the volume of water in the wells and the purge volume were calculated. The well was purged using a 2-inch submersible pump with the pump intake approximately 10 feet into the water column. As drawdown increased, the pump was lowered to prevent exposure of the intake. In this manner, stagnant water was removed from the well casing from the top to the bottom. If no appreciable drawdown was observed, the pump was not lowered and fresh formation water was allowed to be drawn up the casing to the intake point by the pump.

The 2-inch submersible pump is equipped with a check valve which prevents purged water in the discharge hose from draining out of the pump during removal of the pump from the well or while the pump is shut off. Pumping rates of one gallon per minute or less were used to purge wells to minimize the amount of sediment entrained in the water column induced by purging activities.

Three to five well volumes were purged from each monitor well using the 2-inch submersible pump unless the well went dry. Monitor wells MW-26, MW-34D, and MW-35 pumped dry after approximately one well volume and were sampled less than 24 hours later after they had recovered enough to collect the required samples. Less than 5 well volumes were purged only when pH, conductivity, temperature, dissolved oxygen, and turbidity readings stabilized in less than 5 well volumes.

Field parameters (pH, conductivity, temperature, dissolved oxygen, and turbidity) were measured during purging and immediately before collecting groundwater samples from each monitor wells sampled (Table 3-4). Field instruments were calibrated according to the frequency and procedures specified in the site QAPP.

After 5 well volumes had been purged or field parameters stabilized groundwater samples were collected through the 2-inch submersible pump for USEPA Method 8270B (SVOCs), the thirteen PP metals, barium, and cyanide. After non-volatile samples had been collected, the 2-inch submersible pump was removed from the well. Groundwater samples for USEPA Method 8260A (VOCs) were collected from the center of the screened interval using a Teflon™ bailer attached to a Teflon™ coated stainless steel. The VOC samples were collected using the procedures detailed in the site QAPP to minimize aeration of the sample.

Monitor wells that pumped dry (MW-26, MW-34D, and MW-35) were sampled for USEPA Method 8260A, USEPA Method 8270B, the thirteen PP metals, barium, and cyanide from the center of the screened interval using a Teflon™ bailer attached to a Teflon™ coated stainless steel cable. Groundwater samples for USEPA Method 8260A were collected first using the procedures detailed in the site QAPP to minimize aeration of the sample. Samples for USEPA Method 8270B, the thirteen PP metals, barium, and cyanide were collected using the Teflon™ bailer after collection of the USEPA Method 8260A samples.

After collection, sample containers were placed in a cooler containing ice. Duplicate samples were collected by filling containers with equal aliquots of groundwater. Equipment blank, field blank, and duplicate samples were collected according to the frequency and procedures specified in the site QAPP. All sampling equipment was decontaminated in accordance with the QAPP.

The groundwater samples were preserved with ice and relinquished to a courier for delivery to ASI. Analytical reports for the groundwater samples are presented in Volume III, Analytical Data, of the RFI Land Disposal Areas Report. After completion of the sampling and analysis program, the field and analytical data were reviewed and validated according to procedures outlined in the site QAPP. The checklists completed during the data validation are included in Volume III, Analytical Data, of the RFI Land Disposal Areas Report.

Purge water was containerized in DOT-approved 55-gallon drums and labeled with the monitor well identification number, site location, and date. If development water drums at each monitor well location were not completely filled, purge water generated during the groundwater sampling event was placed in the development water drums. Purge water from different monitor wells was not mixed. Groundwater sampling results were used to characterize the IDW purge water. Characterization of the IDW purge water and disposal recommendations are presented in Volume II, Investigation Derived Waste Report, of the RFI Land Disposal Areas Report.

3.9 SITE SURVEY

Abrams Aerial Survey Corporation prepared a site topographic map for the Sloss Industries Corporation Facility during preparation of the RFI Work Plan. During the FWI, information was obtained from Abrams Aerial Survey Corporation on the survey control used during preparation of the base map so that the site surveys for all RFIs could be tied to the existing site map. This site map was used as the base map for the Land Disposal Areas investigation. All surveying completed for the Land Disposal Areas investigation was conducted by a State-certified land surveyor.

In June to August 1997, surficial soil and sludge sample locations, geophysical survey lines, and newly installed monitor well locations were surveyed vertically to mean sea level and tied horizontally to the site base map. Land Disposal Areas survey data is presented in Appendix D and surface elevations for the monitor wells are presented on Table 2-2.

4.0 DESCRIPTION OF INVESTIGATIVE TASKS

During the Land Disposal Areas Investigation, several investigative approaches were utilized in evaluating whether a release had occurred in the past. A geophysical conductivity and/or resistivity survey of the perimeter of SWMU 23 and SWMUs 38 and 39 was performed to locate areas with relatively high conductivities in soil and groundwater which may be a result of migration of contaminants from the SWMUs as leachate. Seismic data collected during the FWI around the perimeter of SWMU 23 and SWMUs 38 and 39 was used to provide data on the depth to bedrock.

The chemical properties of the sludge associated with the Land Disposal Areas SWMUs were investigated to evaluate the potential contaminants present in the sludge. The chemical properties of the surficial and/or subsurface soils and groundwater were investigated to confirm the presence or absence of contamination at these SWMUs. Sludge, surficial and/or subsurface soils, and groundwater samples were analyzed for VOCs (USEPA Method 8260A), SVOCs (USEPA Method 8270B), the thirteen PP metals, barium, and cyanide. Sludge samples were also analyzed for TCLP constituents.

Total VOCs, SVOCs, PP metals, barium, and cyanide data were collected to assess the chemical properties of the sludge samples. The sludge samples were evaluated based on comparison of the TCLP results to RCRA Toxicity Characteristic (TC) levels to assess the potential for chemical constituents present in the sludge to leach into the soil and groundwater.

Soil concentrations were evaluated based upon a comparison to USEPA Region III RBCs for soil ingestion in an industrial setting as presented in the Region III USEPA Risk-Based Concentration Table dated October 22, 1997 (Table 4-1). The industrial RBCs for soil ingestion were used as a screening tool to identify if a potential risk exists. A risk assessment was then conducted to evaluate actual risk which may exist. RBCs are chemical concentrations corresponding to fixed levels of risk (i.e., hazard quotient of 1, or a lifetime cancer risk of 10^{-6}, whichever occurs at a lower concentration). The RBCs were developed by taking toxicity constants (reference doses and carcinogenic potency slopes) and combining these constants with "standard" exposure scenarios. Since an industrial RBC for soil ingestion is not available for lead, the *de facto* residential RBC was used. Industrial RBCs for soil ingestion were not available for several compounds detected including acenaphthylene, benzo(g,h,i)perylene, and phenanthrene (Table 4-1).

Groundwater concentrations were evaluated based upon a comparison to USEPA Maximum Contaminant Levels (MCLs) or Region III RBCs for tap water if an MCL was not available for a constituent. The MCLs or RBCs for tap water were used as a screening tool to identify if a potential risk exists. A risk assessment was then conducted to evaluate actual risk which may exist

Based upon a review of data collected at Land Disposal Areas SWMUs, concentrations of metals detected were below USEPA Industrial RBCs except for arsenic and beryllium. Because concentrations of arsenic and beryllium are naturally high in site soils, site background soil results for these metals were used during the data evaluation (Tables 2-1 and 4-1).

4.1 BIOLOGICAL SLUDGE DISPOSAL AREA (SWMU 23)

4.1.1 Site Specific Geology

SWMU 23 is located on Sand Mountain on the fault slice mapped during the FWI. The fault slice is located between the hanging wall and the footwall of the Opossum Valley Fault. The geology and structural features discussed below are depicted on Figures 2-6 and 4-1. From the base of Sand Mountain to the crest, the Mississippian age Hartselle Sandstone and Tuscumbia Limestone, Silurian age Red Mountain Formation, Mississippian age Fort Payne Chert, and the Pennsylvanian age Pottsville Formation are exposed at the surface, or interpreted to be present although they are covered (Figures 2-6 and 4-1). The formations present on Sand Mountain in the SWMU 23 area dip to the southeast on the eastern slope of the mountain and are overturned on the crest (Figure 2-6). Measured dips range from 32° (southeast) to 80° (overturned) moving up Sand Mountain to the west. The large variations in dip of the rocks on Sand Mountain and overturned beds are the result of complex folding and faulting along the Opossum Valley fault.

The Opossum Valley fault trace is inferred to be present at the contact between the Cambrian age Conasauga Formation and the Hartselle Formation located at the base of the mountain (Figures 2-6, 2-8, and 4-1). The fault slice trace, which is located approximately 500 ft west of SWMU 23, is interpreted to be present at the contact between the Fort Payne Chert and the Pottsville Formation. The fault slice is interpreted to be an anticlinal structure, plunging to the northeast, which was torn from the Birmingham Anticlinorium and faulted stratgraphically downward. The axis of the anticlinal structure of the fault slice trends northeast and is located in the Red Mountain Formation in the vicinity of SWMU 23 (Figure 2-6).

Monitor wells MW-21, MW-25S, and MW-25D were screened in fractured, micritic limestone, interpreted to be within water-bearing portions of the Conasauga Formation, just east of the Opossum Valley Fault. Monitor wells MW-23 and MW-24 were screened in sandstone and shale, interpreted to be within the mapped fault slice in water-bearing portions of the Pennsylvanian Parkwood Formation. Monitor well MW-22 was screened in slightly fractured limestone interpreted to be within the mapped fault slice in water-bearing portions of the Tuscumbia Limestone.

The soil overburden consists primarily of clay (CH to CL) with areas of cherty clay. Thickness of the soil overburden ranges from 0 to 38 feet. The soil overburden is thickest near monitor well MW-23 and thinnest at MW-22. The increased soil thickness in the vicinity of MW-23 is a result of weathering of the relatively less competent chert of the Fort Payne Chert formation. Significant non-native material, related to plant activities, was present overlying soils at monitor wells MW-25S and MW-25D.

4.1.2 Site Specific Hydrogeology

Lithologic samples, geophysical analysis, water-level measurements, and the results of the in-situ permeability testing were used to develop an understanding of the hydrogeology at SWMU 23.

4.1.2.1 Geophysical Evaluation

The geophysical evaluation included the FWI seismic survey conducted in 1995 and the conductivity survey conducted in July 1997. The FWI seismic survey report is presented in Appendix E of the RFI Facility-Wide Report and the Geophysical Investigation Report which presents the results of the conductivity survey is presented in Appendix B of this report.

4.1.2.1.1 Facility-Wide Seismic Investigation

Perimeter seismic data collected during the FWI detected three velocity zones at the site indicating differences in rock materials underlying the Sloss Facility. The three velocities were interpreted to consist of the following: (1) residual soil, (2) the weathered upper bedrock surface, and (3) hard rock with little secondary porosity.

Areas on Sand Mountain (S40 and S41 located west of SWMU 23) are underlain by three layers. The residual soil has velocities of about 2,000 ft/sec (feet/second) (Figure 3-4). The intermediate layer or weathered bedrock, where it exists, has a velocity usually somewhat less than 6,000 ft/sec. The hard bedrock, which was interpreted to have little secondary porosity, has average velocities exceeding 15,000 ft/sec. The higher velocity layer on Sand Mountain shows more variation in bedrock velocity and often have velocities less than 8,000 ft/sec. The lower velocities present on Sand Mountain are within the observed range of shale (6,000 to 10,000 ft/sec).

On Sand Mountain, both deep and shallow depths are observed for the high velocity bedrock. Depths range from approximately 10 feet to over 40 feet. Depths to bedrock of over 40 feet are encountered on spread S40 and indicates undulating weathering of the bedrock surface on Sand Mountain has occurred and often several feet of relief is developed over tens of feet.

4.1.2.1.2 Conductivity Survey

EM-31 and EM-34 conductivity survey lines are shown on Figure 3-2 and the Geophysical Investigation report is included as Appendix B. EM-31 and EM-34 readings were taken every 5 and 25 feet, respectively, and penetrated 18 and 50 ft bls, respectively. A total of four anomalous areas of high conductivity, labeled A, B, C, and D on Figures 1 and 2 of Appendix B, were observed in the EM-31 and EM-34 data.

Anomaly A was observed in the EM-31 and EM-34 data. Anomalies C and D, which occur in the same general region, were observed in the EM-31 and EM-34 data, respectively. Maximum observed conductivities at anomalies A, C, and D were approximately 30 millimho/m, which is slightly higher than average observed shallow and deep conductivities (less than 20 and less than 15 millimho/m, respectively). Anomalies A, C, and D occur in an area where shale and iron-rich sandstone of the Red Mountain Formation has been observed to outcrop and are approximately coincident with observed bedding planes. Shales are often conductive due to their bedding structure and high porosity.

Anomaly B is a well-defined feature and was only observed in the shallow EM-31 data. The well-defined nature of Anomaly B indicates it may be a result of increased soil thickness or increased bedrock porosity due to fracturing in the vicinity of the anomaly. Increased conductivities which result from the presence of conductive fluids (e.g. leachate) in the subsurface are generally more extensive features than observed at Anomaly B.

4.1.2.2 Hydrogeology

In the vicinity of SWMU 23, the observed groundwater elevations range from 535.24 (MW-22) to 603.90 (MW-23) ft amsl (Table 2-2 and Figure 2-9). The direction of groundwater flow is to the east toward the base of Sand Mountain.

Hydraulic conductivities calculated from slug tests conducted on monitor wells surrounding SWMU 23 range from 6 x 10^{-6} cm/sec (MW-25D) to 3 x 10^{-3} cm/sec (MW-22) (Table 4-2). Relatively high conductivities in the Tuscumbia Limestone at monitor well MW-22 may be responsible for decreased observed water table elevations. The average horizontal hydraulic gradient in the vicinity of SWMU 23 is 0.100 ft/ft. This average hydraulic gradient was used to calculate groundwater flow velocities, using an assumed porosity of 0.20 for formation materials. Calculated groundwater flow velocities at SWMU 23 range from 3 ft/year (MW-25D) to 1000 ft/year (MW-22).

4.1.3 <u>Sludge Sampling</u>

Five (5) sludge samples (including 1 duplicate sample) were collected from four locations at SWMU 23 and analyzed for VOCs, SVOCs, PP Metals, barium, cyanide, and TCLP constituents (Table 3-2 and Figure 3-2).

4.1.3.1 Sludge Description

Sludge samples collected from SWMU 23 were black to moderate brown in color and were composed of clay/silt sized material (Appendix A.2). All sludge samples from SWMU 23 were moist to saturated and had a septic odor.

4.1.3.2 Chemical Characteristics

4.1.3.2.1 Total Volatile Organic Compounds

Five VOCs including 2-butanone, acetone, ethylbenzene, toluene, and xylenes were detected in sludge samples collected at SWMU 23 (Table 4-3).

4.1.3.2.2 Total Semivolatile Organic Compounds

Fifteen PAHs and 4-methylphenol (p-cresol) were detected in sludge samples collected at SWMU 23 (Table 4-3). Total PAH concentrations ranged from 55,600 to 357,100 ug/kg.

4.1.3.2.3 Total Metals and Cyanide

Cyanide and ten of the thirteen PP metals were detected in sludge samples collected at SWMU 23 (Table 4-3).

4.1.3.2.4 TCLP Analyses

TCLP VOCs, SVOCs, organochlorine pesticides, and chlorinated herbicides were not detected in sludge samples collected at SWMU 23 (Table 4-4). Two TCLP metals, barium and chromium, were detected in the sludge samples (Table 4-4). Barium was detected in all of the sludge samples and concentrations ranged from 3.5 to 18 milligrams per liter (mg/L). These concentrations were well below the RCRA TC level of 100 mg/L. Chromium was detected in two of four sludge samples at concentrations of 0.12 and 0.18 mg/L which were below the RCRA TC level of 5 mg/L.

4.1.4 Subsurface Soil Sampling

Nine (9) subsurface soil samples (including one duplicate sample) were collected at the five (5) monitor well locations around the perimeter of SWMU 23 and analyzed for VOCs, SVOCs, PP metals, barium, and cyanide (Table 3-3 and Figure 3-2).

4.1.4.1 Soil Description

Soils from SWMU 23 were composed primarily of light brown, stiff to plastic clay (CL to CH) with minor amounts of chert and sandstone fragments (Appendix A.3). Saturated soil conditions were not encountered until directly above the bedrock surface. No odor was detected in the soil samples and OVM readings were below detection limits in all samples.

4.1.4.2 Chemical Characteristics

4.1.4.2.1 Total Volatile Organic Compounds

Acetone was detected in one soil sample, 970805-LD-23-SL0025(19-21), collected from SWMU 23 (Table 4-5). The detected acetone concentration was well below the USEPA Industrial RBC of 200,000,000 ug/kg. Acetone is typically a result of lab or field decontamination procedures.

4.1.4.2.2 Total Semivolatile Organic Compounds

SVOCs were not detected in subsurface soil samples collected at SWMU 23 (Table 4-5).

4.1.4.2.3 Total Metals and Cyanide

Cyanide and nine of the 13 PP metals were detected in soil samples collected from SWMU 23 (Table 4-5). The concentration of lead detected was below the USEPA Residential RBC. Detected barium, beryllium, cadmium, chromium, copper, lead, nickel, zinc, and cyanide concentrations were below USEPA Industrial RBC concentrations.

Arsenic was detected above the USEPA Industrial RBC of 3.8 mg/kg in soil samples 970806-LD-23-SL0022(0-2), 970806-LD-23-SL0023(24-26), 970805-LD-23-SL0024(7-9), and 970805-LD-23-SL0024(14-16) at 4.6, 6.3, 13, and 30 mg/kg, respectively. Only soil sample, 970805-LD-23-SL0024(14-16), was outside the arsenic range observed in background soil samples (1.9 to 21 mg/kg) collected as part of the FWI (Table 4-1). The presence of arsenic in the background soil samples and the fact that arsenic was not detected in TCLP sludge samples suggests this metal is not derived from the sludge material. Furthermore, this soil sample location is upgradient of SWMU 23 and the arsenic concentration in the 7 to 9 ft bls soil sample collected at the same location had a lower arsenic concentration (13 mg/kg).

4.1.5 Groundwater Quality

At SWMU 23, seven (7) groundwater samples (including one duplicate sample) were collected at monitor wells MW-21, MW-22, MW-23, MW-24, MW-25S, and MW-25D, and analyzed for VOCs, SVOCs, PP metals, barium, and cyanide (Figure 3-2). Field analyses conducted during groundwater sampling are summarized on Table 3-4.

4.1.5.1 Volatile Organic Compounds

Acetone was detected in groundwater sample 970818-LD-23-GW0022 collected from monitor well MW-22 (110 micrograms per liter [ug/L]); however, acetone was not detected in the soil sample collected at MW-22 (Tables 4-5 and 4-6). The detected acetone concentration was well below the USEPA RBC for tap water of 3,700 ug/L. Acetone is a common lab or field decontamination contaminant.

4.1.5.2 Semivolatile Organic Compounds

SVOCs were not detected in groundwater samples collected at SWMU 23 (Table 4-6).

4.1.5.3 Metals and Cyanide

Cyanide and metals including barium, chromium, copper, nickel, and zinc were detected in groundwater samples collected from SWMU 23 (Table 4-6). Detected cyanide and metal concentrations were below USEPA MCLs.

4.1.6 Summary

SWMU 23 is located on Sand Mountain on the fault slice mapped during the FWI. The fault slice, which is interpreted to be an anticlinal structure, is located between the hanging wall and the footwall of the Opossum Valley Fault. The formations present on Sand Mountain range from Silurian to Pennsylvanian age and dip to the southeast on the eastern slope of the mountain and are overturned on the crest.

Perimeter seismic data collected during the FWI detected three velocity zones at the site indicating differences in rock materials underlying the Sloss Facility. The three velocities were interpreted to consist of the following: (1) residual soil, (2) the weathered upper bedrock surface, and (3) hard rock with little secondary porosity. Depths to bedrock of over 40 feet were encountered in the seismic survey and indicates undulating weathering of the bedrock surface on Sand Mountain has occurred and often several feet of relief is developed over tens of feet.

A total of four anomalous areas of high conductivity, A, B, C, and D, were observed in the EM-31 and EM-34 data. Anomalies A, C, and D occur in an area where shale and iron-rich sandstone of the Red Mountain Formation has been observed to outcrop and are approximately coincident with observed bedding planes. Shales are often conductive due to their bedding structure and high porosity. The well-defined nature of Anomaly B indicates it may be a result of increased soil thickness or increased bedrock porosity due to fracturing in the vicinity of the anomaly. Increased conductivities which result from the presence of conductive fluids (e.g. leachate) in the subsurface are generally more extensive features than observed at Anomaly B.

In the vicinity of SWMU 23, the observed groundwater elevations range from 535.24 to 603.90 ft amsl. The direction of groundwater flow is to the east toward the base of Sand Mountain. Hydraulic conductivities calculated from slug tests conducted on monitor wells surrounding SWMU 23 range from 6×10^{-6} to 3×10^{-3} cm/sec and calculated groundwater flow velocities range from 3 to 1000 ft/year.

Five VOCs, 16 SVOCs including 15 PAHs and 4-methylphenol (p-cresol), 10 PP metals, and cyanide were detected in sludge samples collected from SWMU 23. TCLP metals barium and chromium were detected in the sludge samples collected from SWMU 23, but concentrations were well below RCRA TC levels.

Acetone, nine PP metals, and cyanide were detected in subsurface soil samples collected at SWMU 23. All detected parameters, except for arsenic, were below USEPA Industrial RBCs for soil ingestion. Arsenic exceeded the USEPA Industrial RBC in four subsurface soil samples; however, only one soil sample was outside the range for arsenic observed in background soil samples.

Acetone, barium, chromium, copper, nickel, zinc, and cyanide were detected in groundwater samples from SWMU 23. The USEPA RBC for tap water was not exceeded for acetone and USEPA MCLs were not exceeded for the other constituents.

4.1.7 Conclusions

Although only one arsenic concentration exceeded the USEPA Industrial RBC for soil ingestion and was outside the observed arsenic range in background samples, a risk evaluation will be prepared for this SWMU as proposed in the RFI Work Plan.

4.2 BLAST FURNACE EMMISIONS CONTROL SLUDGE WASTE PILE (SWMU 24)

4.2.1 Site Specific Geology

SWMU 24 is located east of the Opossum Valley Fault mapped during the FWI and is underlain by the Conasauga Formation (Figures 2-6 and 2-8). Measured dips of the Conasauga Formation range from 26° to 32° to the southeast.

Although monitor wells and piezometers have not been installed at SWMU 24, several monitor wells and FWI perimeter piezometers (P-2, P-3, P-4, MW-5, and MW-36) have been installed around the perimeter of the Sloss Facility or in adjacent SWMUs (Figure 2-2). These monitor wells and piezometers are screened in micritic limestone, interpreted to be within water-bearing portions of the Conasauga Formation. Typically, according to litholgic data, portions of the Conasauga Formation are more permeable near the weathered bedrock surface. Seismic data collected during the FWI indicated the upper Conasauga Formation has lower velocities and is more permeable than lower portions throughout the Sloss Facility.

The inferred bedrock topography of the SWMU 24 area is presented on Figure 2-8. The soil overburden at nearby piezometers and monitor wells consist primarily of clay (CH to CL) and the soil thickness ranges from 6 to 22 feet. The soil overburden is thickest at piezometer P-2 and thinnest at monitor well MW-5.

4.2.2 Site Specific Hydrogeology

Lithologic samples, geophysical analysis, water-level measurements, and the results of the in-situ permeability testing in SWMUs adjacent to SWMU 24 were used to infer the hydrogeology at SWMU 24.

In the vicinity of SWMU 24, the observed groundwater elevations range from 517.61 (P-2) to 535.14 (MW-36) ft amsl. The shallow groundwater flow direction is to the northeast toward Five Mile Creek (Table 2-2 and Figure 2-9).

A downward hydraulic gradient of 0.12 ft/ft was present at monitor well MW-5 and piezometer P-4, screened in the upper Conasauga Formation, on May 17, 1997.

Hydraulic conductivities calculated from slug tests conducted on piezometers and monitor wells surrounding SWMU 24 range from 4 x 10^{-8} cm/sec (P-4) to 9 x 10^{-3} cm/sec (MW-5) (Table 4-2). Piezometers P-4 and MW-5 are a piezometer couplet and P-4 is screened approximately 20 feet deeper than monitor well MW-5. The difference in conductivities between P-4 and MW-5 is probably a result of the former being screened within less permeable portions of the Conasauga Formation. The average horizontal hydraulic gradient in the vicinity of SWMU 24 is 0.025 ft/ft. This hydraulic gradient was used to calculate groundwater flow velocities using an assumed porosity of 0.01 for P-4 and 0.20 for the remaining piezometers and monitor wells. Calculated groundwater flow velocities surrounding SWMU 24 range from 0.1 ft/year (P-4) to 1000 ft/year (MW-5).

4.2.3 Sludge Sampling

Five (5) sludge samples (including 1 duplicate sample) were collected from four locations at SWMU 24 and analyzed for VOCs, SVOCs, PP metals, barium, cyanide, and TCLP constituents (Table 3-2 and Figure 3-1).

4.2.3.1 Sludge Description

Sludge samples collected from SWMU 24 were dusky brown in color and were composed of silt to fine grained sand sized material (Appendix A.2). All sludge samples from SWMU 24 were dry and had no odor.

4.2.3.2 Chemical Characteristics

4.2.3.2.1 Total Volatile Organic Compounds

VOCs were not detected in sludge samples collected from SWMU 24 (Table 4-7).

4.2.3.2.2 Total Semivolatile Organic Compounds

SVOCs were not detected in sludge samples collected from SWMU 24 (Table 4-7).

4.2.3.2.3 Total Metals and Cyanide

Cyanide and 11 of the 13 PP metals were detected in the SWMU 24 sludge samples (Table 4-7).

4.2.3.2.4 TCLP Analyses

TCLP VOCs, SVOCs, organochlorine pesticides, and chlorinated herbicides were not detected in the sludge samples (Table 4-8). Two TCLP metals, barium and cadmium, were detected in the sludge samples (Table 4-8). Barium was detected in all of the sludge samples and concentrations ranged from 0.6 to 1.2 mg/L. These concentrations were well below the RCRA TC level of 100 mg/L for barium. Cadmium was detected in four of the five sludge samples at concentrations ranging from 0.01 to 0.06 mg/L which were below the RCRA TC level of 1 mg/L.

4.2.4 Surficial Soil Sampling

Sixteen (16) subsurface soil samples (including one duplicate sample) were collected at fifteen (15) locations around the perimeter of SWMU 24 and analyzed for VOCs, SVOCs, PP metals, barium, and cyanide (Table 3-1 and Figure 3-1).

4.2.4.1 Soil Description

Soils from SWMU 24 were composed primarily of moderate brown, stiff to plastic clay (CL to CH) with some light brown to grayish orange mottling, root material, and minor amounts of rock fragments (Appendix A.1). Saturated soil conditions were not encountered in soil samples from locations 24-SL0005 and 24-SL0007; soil samples from the remaining locations were dry to moist. No odors were detected in soil samples except for the sample from location 24-SL0007. Soil collected from sample location 24-SL0007 had a chemical odor and minor amounts of a black "tar-like" substance was observed in the sample.

4.2.4.2 Chemical Characteristics

4.2.4.2.1 Total Volatile Organic Compounds

Acetone was detected at 150 ug/kg in one soil sample, 970618-LD-24-SL0012, collected from SWMU 23 (Table 4-9). The detected concentration was well below the USEPA Industrial RBC of 200,000,000 ug/kg. Acetone is typically a result of lab or field decontamination procedures. No other VOCs were detected in surficial soil samples collected at SWMU 24.

4.2.4.2.2 Total Semivolatile Organic Compounds

Sixteen PAHs were detected in surficial soil samples collected at SWMU 24 (Table 4-9). Concentrations of acenaphthene, anthracene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, naphthalene, and pyrene detected were below USEPA Industrial RBCs for soil ingestion in all samples. There are no USEPA Industrial RBCs calculated for acenaphthylene, benzo(g,h,i)perylene, and phenanthrene.

Benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were detected above their USEPA Industrial RBCs of 7,800 ug/kg in soil sample 970618-LD-24-SL0014 (63,000, 33,000, and 22,000 ug/kg, respectively).

Benzo(a)pyrene was detected above the USEPA Industrial RBC of 780 ug/kg in soil samples 970617-LD-24-SL0003 (1,400 ug/kg), 970618-LD-24-SL0011 (2,100 ug/kg), 970618-LD-24-SL-0014 (36,000 ug/kg), and 970618-LD-24-SL0016 (3,400 ug/kg) (Table 4-9).

PAHs were not detected in sludge samples collected at SWMU 24. The absence of PAHs in the sludge samples suggests that PAHs detected in surficial soil samples are not derived from the sludge material.

Soil samples that contain concentrations of PAHs exceeding USEPA Industrial RBCs are located in areas where runoff collects or drainage from areas upgradient of SWMU 24 occurs. Soil location 24-SL0003 is adjacent to a drainage ditch located along the north side of Summit Street (Figure 3-1). Soil location 24-SL0014 is located near a low area where standing water was observed during sampling. Soil location 24-SL0011 is located east of the storm water runoff sewer (SWMU 23). The distribution of PAHs which exceed USEPA Industrial RBCs, except for 24-SL0011, suggests the presence of the PAHs may be related to transport from sources upgradient of SWMU 24 and possibly offsite sources. Elevated PAH concentrations at soil sampling location 24-SL0011 may be related to past waste management practices when plant wastes were discharged directly to the polishing pond area prior to construction of the BTF in 1976.

4.2.4.2.3 Total Metals and Cyanide

Cyanide and 12 of the 13 PP metals were detected in surficial soil samples collected from SWMU 24. The concentration of lead detected was below the USEPA Residential RBC. Cyanide and all other detected metals except for arsenic and beryllium were below USEPA Industrial RBCs for soil ingestion.

Arsenic concentrations ranged from 5.5 to 21 mg/kg and exceeded the USEPA Industrial RBC of 3.8 mg/kg in all soil samples; however, detected arsenic concentration were within the range of arsenic detected in background soil samples (1.9 to 21 mg/kg) (Tables 4-1 and 4-9). Arsenic was not detected in TCLP sludge samples which suggests it is not derived from the sludge material.

Beryllium was detected in 5 of the 16 soil samples collected at SWMU 24 and concentrations ranged from 1.2 to 2.1 mg/kg (Table 4-9). Detected beryllium concentrations exceeded the USEPA Industrial RBC of 1.3 mg/kg in soil samples 970617-LD-24-SL0005 (2.1 mg/kg), 970618-LD-24-SL0011 (1.4 mg/kg), and 970618-LD-24-SL0016 (1.7 mg/kg); however, these concentrations were within the observed range of beryllium (0.44 to 2.6 mg/kg) in background soil samples (Table 4-1).

4.2.5 Summary

SWMU 24 is located east of the Opossum Valley and is underlain by the Conasauga Formation. Measured dips of the Conasauga Formation range from 26° to 32° to the southeast. The soil overburden at nearby piezometers and monitor wells consist primarily of clay (CH to CL) and the soil thickness ranges from 6 to 22 feet.

In the vicinity of SWMU 24, the observed water table elevations range from 517.61 to 535.14 ft amsl and the shallow groundwater flow direction is to the northeast toward Five Mile Creek. Hydraulic conductivities calculated from slug tests conducted on piezometers and monitor wells surrounding SWMU 24 range from 4×10^{-8} to 9×10^{-3} cm/sec and calculated groundwater flow velocities range from 0.1 to 1000 ft/year.

Cyanide and 11 of the 13 PP metals were detected in sludge samples from SWMU 24. TCLP metals, barium, and cadmium, were detected in the sludge samples but were below RCRA TC levels.

Acetone, sixteen PAHs, 12 of the 13 PP metals, and cyanide were detected in surficial soil samples from SWMU 24. Benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were detected above USEPA Industrial RBCs in one soil sample and benzo(a)pyrene was detected above its RBC in several soil samples. PAHs were not detected in sludge samples collected at SWMU 24. The absence of PAHs in the sludge samples suggests that the PAHs detected in surficial soil samples are not derived from the sludge material. The presence of PAHs in the soil may be a result of transport from upgradient and possibly offsite sources or past waste management practices. Arsenic and beryllium exceeded RBCs; however, the concentrations were within observed concentration ranges in background soil samples.

4.2.6 Conclusions

Since concentrations of benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, arsenic, and beryllium detected at SWMU 24 exceeded USEPA Industrial RBCs for soil ingestion, a risk evaluation is appropriate for this SWMU.

4.3 LANDFILL AND BLAST FURNACE EMISSION CONROL SLUDGE WASTE PILE NEAR LANDFILL (SWMUS 38 AND 39)

4.3.1 Site Specific Geology

SWMUs 38 and 39 are located east of the Opossum Valley Fault mapped during the FWI and are underlain by the Conasauga Formation. Measured dips range from 26° to 32° to the southeast. The geology and structural features discussed below are depicted on Figures 2-6, 2-7, and 4-2. The cross section locations are presented on Figure 2-2.

Monitor wells MW-26 through MW-36 were screened in a micritic limestone interpreted to be within water-bearing portions of the Conasauga Formation, just east of the Opossum Valley fault. At SWMUs 38 and 39, a high degree of fracturing was observed in the vicinity of monitor wells MW-27, MW-29, MW-30S, MW-30D, MW-33 and MW-37. MW-35 appears to be screened within a relatively less permeable portion of the upper Conasauga Formation and may indicate that little weathering and or fracturing of the bedrock is present. Monitor well MW-26 and MW-34D are screened within less permeable portions of the deep Conasauga Formation (> 140 ft bls). Monitor wells MW-26, MW-34D, and MW-35 pumped dry during development and groundwater sampling. After 24 hours, water levels in these wells did not recover and were significantly less than the initial water levels measured in the wells prior to pumping.

The soil overburden consists primarily of clay (CH to CL) with areas of sandy and gravely clay. Thickness of the soil overburden ranges from 0 to 38 feet. The soil overburden is thickest in the near monitor well MW-27 and thinnest at MW-37. Significant non-native material related to plant activities was present overlying soils or almost directly on top of the bedrock surface at monitor wells MW-31, MW-32, MW-33, MW-34S, MW-34D, and MW-35 (Figure 4-2). Bedrock topography for the SWMU 38 and 39 area is presented in Figure 2-8.

4.3.2 Site Specific Hydrogeology

Lithologic samples, geophysical surveys, water-level measurements, and the results of the in-situ permeability testing were used to develop an understanding of the hydrogeology at SWMUs 38 and 39.

4.3.2.1 Geophysics Evaluation

The FWI seismic survey report is presented in Appendix E of the RFI Facility-Wide Report and the Geophysical Investigation Report which presents the results of the conductivity and/or resistivity survey are presented in Appendix B of this report.

4.3.2.1.1 Facility-Wide Seismic Investigation

Perimeter seismic data collected during the FWI detected three velocity zones at the site indicating differences in rock materials underlying the Sloss Facility. The three velocities were interpreted to consist of the following: (1) residual soil, (2) the weathered upper bedrock surface of the Conasauga Limestone, and (3) hard rock with little secondary porosity.

Seismic spreads indicated that residual soil rests on an intermediate layer of fractured and weathered bedrock which in turn rests on a high velocity bedrock west of the LaFarge Quarry (S5, S6, S29, S35) (Figure 3-4). Residual soils at the northern end of the main plant area, where SWMUs 38 and 39 are located, have more variable velocities, generally ranging from 2000 ft/sec to over 4,000 ft/sec.

The intermediate layer or weathered limestone, where it exists, has a velocity usually somewhat less than 6,000 ft/sec. The velocity of the intermediate layer is at the lower end of the range of velocity observed in weathered limestone.

The higher velocity layer (hard bedrock with little secondary porosity) in the northern end of the main plant, where SWMUs 38 and 39 are located, show some variation in bedrock velocity and often have velocities less than 8,000 ft/sec. Two spreads in the north end of the main plant area, centered about spreads S6 and S29 (near monitor wells MW-34S, MW-34D, MW-35, MW-37 and MW-27), have higher velocities exceeding 20,000 ft/sec and reflect the presence of unweathered and unfractured blocks of bedrock.

The northern part of the main plant area, which includes SWMUs 38 and 39, has variable high velocity bedrock depths generally over 20 feet. Bedrock in the north end of the main plant area is generally deeper than in the rest of the site. The deeper areas are seen on spreads S6, S34, and S35. Seismic data indicates variable weathering of the top of the Conasauga Formation has occurred and often several feet of relief is developed over tens of feet.

4.3.2.1.2 Conductivity/Resistivity Survey

EM-31 conductivity and resistivity survey lines are shown on Figure 3-3 and the Geophysical Investigation report is included as Appendix B. EM-31 readings were taken every 5 feet around the northern, eastern, and southern perimeter of SWMUs 38 and 39 and penetrated approximately 20 ft bls. Shallow resistivity readings were collected along the western perimeter of SWMU 38 with a 20 foot array length. Deep resistivity readings were collected around the perimeter of SWMUs 38 and 39 with a 100 foot array length.

Before any resistivity data was recorded two Schlumberg soundings (S1 and S2) were conducted on the western and eastern side of SWMUs 38 and 39, respectively. Results of the two soundings indicates bedrock is at 9.5 and 21 ft bls at S1 and S2, respectively, and the overburden is more conductive than the limestone bedrock. Furthermore, Schlumberg soundings confirm the general rock resistivity assumptions used for evaluating the resistivity data.

A total of four anomalous areas of high conductivity, labeled E, F, G, and H on Figures 1 and 2 of Appendix B, were observed in the EM-31 and resistivity data. Anomaly E, F, and H were observed in the EM-31 and resistivity data. Anomaly G was only observed in the EM-31 data.

Anomalies E and F are broad features in the shallow and deep data. An underground pipe connecting the storm water runoff sewer (SWMU 25) to the polishing pond at the BTF is present in the vicinity of Anomaly E and may be the cause of higher conductivities in this region. Higher conductivities at Anomaly E may also be the result of increased overburden thickness in this area although drilling logs and seismic data indicate the soil thickness is approximately constant or thinner in this area.

Review of historic aerial photos indicates Summit Road was realigned in the late 1970's over portions of SWMU 24 which is composed of sludge (flue dust) generated in the former blast furnace. Anomalies E and F are in the area formerly occupied by SWMU 24 and higher conductivities in this area may be a result of the presence of minor amounts of flue dust material beneath the road not removed during realignment of Summit Road. Anomalies E and F are similar to Anomaly H which is believed to be due to the presence of flue dust in this area.

Anomaly G is only present in the shallow data and coincides with the overhead contact cooling water pipeline. Anomaly G is not considered to be an indicator of a bedrock anomaly in this area.

Anomaly H is present in both the shallow and deep data and is thought to be due to the presence of conductive sludge (flue dust) material in the subsurface at this location. Flue dust was observed at the surface in the vicinity of Anomaly H during the geophysical field program. The geophysics survey line was located close to the waste pile at the southern end of SWMU 39 in order to minimize the effect of overhead power lines present at this location and due to the presence of slag piles related to activities conducted by Vulcan Materials. Vulcan Materials leases the property south of SWMU 39 from Sloss Industries.

4.3.2.2 Hydrogeology

In the vicinity of SWMUs 38 and 39, the observed groundwater elevations in the upper Conasauga Formation range from 516.13 (MW-35) to 552.59 (MW-32) ft amsl (Table 2-2 and Figure 2-9). The observed potentiometric surface elevations in the lower Conasauga Formation range from 464.10 (MW-26) to 540.41 (MW-34D) ft amsl (Table 2-2 and Figure 2-10). The potentiometric surface elevations in the upper and lower Conasauga Formation at monitor well couplet MW-34S and MW-34D are approximately equivalent. However, the potentiometric surface elevation at monitor well MW-26 is significantly less than the potentiometric surface elevation at nearby monitor well MW-27 and indicates the upper and lower units are not hydraulically connected at all locations throughout the site.

An upward vertical hydraulic gradient of 0.0010 ft/ft was present at monitor wells MW-30S and MW-30D, screened in the upper Conasauga Formation, on August 17, 1997. An upward and downward hydraulic gradient of 0.0057 and 0.69 ft/ft was present between the upper and lower Conasauga Formation at monitor wells pairs MW-34S/MW-34D and MW-26/MW-27, on August 17, 1997, respectively. The change in hydraulic gradients at monitor well pairs MW-34S/MW-34D and MW-26/MW-27 may be a result of complex recharge/discharge relationships caused by ongoing mining activities at the Southern Ready Mix Quarry located approximately ¼ mile northeast of Sloss Industries.

The groundwater flow direction in the upper Conasauga Formation is to the northeast toward Five Mile Creek (Figure 2-9). In the SWMU 38 and 39 area, the groundwater flow direction in the lower Conasauga Formation appears to be to the south (Figure 2-10).

Hydraulic conductivities calculated from slug tests performed in the upper portion of the Conasauga Formation surrounding SWMUs 38 and 39 range from 4 x 10^{-8} cm/sec (MW-35) to 7 x 10^{-2} cm/sec (MW-29). Hydraulic conductivities at SWMUs 38 and 39 in the lower, less permeable portions of the Conasauga Formation range from 1 x 10^{-7} to 2 x 10^{-7} cm/sec at MW-34D. The average hydraulic gradient in the vicinity of SWMUs 38 and 39 is 0.025 ft/ft. This average hydraulic gradient was used to calculate groundwater flow velocities using an assumed porosity of 0.20 for upper Conasauga Formation materials. For monitor well MW-35, screened within the upper Conasauga Formation, a porosity of 0.01 was used since well recovery was similar to wells screened within the lower Conasauga Formation. Calculated groundwater flow velocities in the upper Conasauga Formation range at SWMUs 38 and 39 from 0.3 ft/year (MW-35) to 9000 ft/year (MW-29). Calculated groundwater flow velocities in the lower Conasauga Formation, which were calculated using the same gradient as in the upper Conasauga Formation and a porosity of 0.01, range from 0.3 to 0.6 ft/year at MW-34D.

4.3.3 SWMU 39 Sludge Sampling

Seven (7) sludge samples (including 1 duplicate sample) were collected from six locations at SWMU 39. Four of the six samples were analyzed for VOCs, SVOCs, PP metals, barium, cyanide, and TCLP constituents (Table 3-2 and Figure 3-3).

4.3.3.1 Sludge Description

Sludge samples collected from SWMU 39 were dusky brown in color and were composed of silt to fine grained sand sized material (Appendix A.2). All sludge samples from SWMU 39 were dry and had no odor.

4.3.3.2 Chemical Characteristics

4.3.3.2.1 Total Volatile Organic Compounds

VOCs were not detected in sludge samples collected from SWMU 24 (Table 4-10).

4.3.3.2.2 Total Semivolatile Organic Compounds

One SVOC, benzo(k)fluoranthene, was detected in sludge sample 970619-LD-39-SM0006 at a concentration of 30 ug/kg (Table 4-10).

4.3.3.2.3 Total Metals and Cyanide

Cyanide and 10 of the 13 PP metals were detected in sludge samples collected from SWMU 39 (Table 4-10).

4.3.3.2.4 TCLP Analyses

TCLP VOCs, SVOCs, organochlorine pesticides, and chlorinated herbicides were not detected in sludge samples (Table 4-11). TCLP metals, barium, and cadmium, were detected in the sludge samples collected at SWMU 39 (Table 4-11). Barium was detected in three of the four samples and concentrations ranged from 0.91 to 2.8 mg/L. These concentrations were well below the RCRA TC level of 100 mg/L. Cadmium was detected in sludge sample 970616-LD-39-SM0002 at a concentration of 0.036 mg/L which was below the RCRA TC level of 1 mg/L.

4.3.4 Subsurface Soil Sampling

Twenty-one (21) subsurface soil samples (including two duplicate sample) were collected at ten (10) locations monitor well locations around the perimeter of SWMUs 38 and 39 and analyzed for VOCs, SVOCs, PP metals, barium, and cyanide (Table 3-3 and Figure 3-3).

4.3.4.1 Soil Description

Soils from SWMU 38 were composed primarily of pale yellowish brown to moderate reddish brown, stiff to plastic clay (CL to CH) with some dusky red mottling, iron concretions, and minor amounts of micritic limestone fragments (Appendix A.3). Soils from SWMU 39 were composed primarily of light brown to pale olive, stiff to plastic clay (CL to CH) with minor amounts of rounded pebbles and micritic limestone fragments. Saturated soil conditions were not encountered until directly above the bedrock surface. No odor was detected in soil samples and OVM readings were below detection limits in all samples.

4.3.4.2 Chemical Characteristics

4.3.4.2.1 Total Volatile Organic Compounds

Toluene was detected in soil sample 970804-LD-38-SL9026 (duplicate of 970804-LD-38-SL0026(10-12) at 8 ug/kg (Table 4-12). The concentration of toluene detected was below the USEPA Industrial RBC of 410,000,000 ug/kg. In the remaining samples collected from SWMUs 38 and 39, VOCs were not detected (Table 4-12).

4.3.4.2.2 Total Semivolatile Organic Compounds

SVOCs were not detected in subsurface soil samples collected from SWMUs 38 and 39 (Table 4-12).

4.3.4.2.3 Total Metals and Cyanide

Cyanide and 10 of the 13 PP metals were detected in soil samples collected from SWMUs 38 and 39 (Table 4-12). Detected lead concentrations were below the USEPA Residential RBC and detected antimony, barium, chromium, copper, lead, nickel, silver, zinc, and cyanide concentrations were below USEPA Industrial RBCs.

Arsenic was detected above the USEPA Industrial RBC of 3.8 mg/kg in soil samples 970805-LD-38-SL0027(11-13), 970807-LD-38-SL0030(9-11), 970807-LD-38-SL0030(17-19), 970808-LD-39-SL0033(11-13), 970805-LD-39-SL0034(10-12), 970804-LD-39-SL00036(5-7), and 970804-LD-39-SL0036(10-12) at concentrations ranging from 4.1 to 5.2 mg/kg. All concentrations of arsenic which exceeded the USEPA Industrial RBC were within the range observed in background soil samples (1.9 to 21 mg/kg) collected as part of the FWI (Table 4-1). The presence of arsenic in the background soil samples and the fact that arsenic was not detected in TCLP sludge samples collected at SWMU 39 suggests arsenic in the soil at SWMU 39 is not derived from the sludge material.

Beryllium was detected above the USEPA Industrial RBC of 1.3 mg/kg in soil samples 970804-LD-38-SL0026(10-12), 970804-LD-38-SL9026 (duplicate of 970804-LD-38-SL0026[10-12]), and 970807-LD-38-SL0029(19-21) at 1.9, 1.6, and 2.8 mg/kg, respectively. Beryllium concentrations which exceeded the USEPA Industrial RBC were within the range observed in background soil samples (0.44 to 2.6 mg/kg) collected as part of the FWI (Table 4-1).

4.3.5 Groundwater Quality

Fifteen (15) groundwater samples (including one duplicate sample) were collected at SWMUs 38 and 39 from monitor wells MW-26, MW-27, MW-28, MW-29, MW-30S, MW-30D, MW-31, MW-32, MW-33, MW-34S, MW-34D, MW-35, MW-36, and MW-37. The groundwater samples were analyzed for VOCs, SVOCs, PP metals, barium, and cyanide (Figure 3-3). Field analyses conducted during groundwater sampling are summarized on Table 3-4.

4.3.5.1 Volatile Organic Compounds

VOCs including acetone, benzene, toluene, trichloroethene, and xylenes were detected in groundwater samples collected from SWMUs 38 and 39 (Table 4-13). Detected toluene, trichloroethene, and xylene concentrations were below USEPA MCLs and acetone was below the USEPA RBC for tap water.

Benzene was detected above the USEPA MCL of 5 ug/L in groundwater samples 970821-LD-38-GW0026 (13 ug/L) and 970831-LD-39-GW0034D (6 ug/L) collected from the deep Conasauga Formation (Table 4-13). Benzene was not detected in sludge or soil samples collected at SWMUs 38 and 39.

4.3.5.2 Semivolatile Organic Compounds

SVOCs were not detected in groundwater samples collected from SWMUs 38 and 39 (Table 4-13).

4.3.5.3 Metals and Cyanide

Cyanide and PP metals including barium, chromium, copper, zinc, lead, and silver were detected in groundwater samples collected from SWMUs 38 and 39 (Table 4-13). Detected barium, chromium, copper, and zinc concentrations were below USEPA MCLs.

Lead was detected above the USEPA MCL of 0.015 mg/L in groundwater sample 970821-LD-39-GW0034D (0.04 mg/L) (Table 4-13). This elevated concentration of lead may be attributed to suspended sediment in the well since the water was slightly turbid. Silver was detected above the USEPA MCL of 0.1 mg/L in groundwater sample 970821-LD-39-GW0036 (0.24 mg/L) (Table 4-12).

Cyanide was detected in six of the eight groundwater samples collected at SWMU 39 but concentrations only exceeded the USEPA MCL of 0.2 mg/L in two of the six groundwater sampling locations. The USEPA MCL for cyanide was exceeded in groundwater samples 970821-LD-39-GW0032 (0.38 mg/L), 970820-LD-39-0034S (0.21 mg/L), and 970820-LD-39-9034S (duplicate of 970820-LD-39-0034S) (0.22 mg/L) which are located in the vicinity of the southern portion of SWMU 39. Cyanide was not detected in monitor wells installed around the perimeter of SWMU 38.

4.3.6 Summary

SWMUs 38 and 39 are located east of the Opossum Valley Fault mapped during the FWI and are underlain by the Conasauga Formation. Measured dips range from 26° to 32° to the southeast. The soil overburden ranges from 0 to 38 ft thick and consists primarily of clay (CH to CL) with areas of sandy and gravely clay; however, significant non-native material related to plant activities was present overlying soils or almost directly on top of the bedrock surface at monitor wells in the area of SWMU 39.

Perimeter seismic data collected during the FWI detected three velocity zones at the site indicating differences in rock materials underlying the Sloss Facility and in the SWMU 38 and 39 area. The three velocities were interpreted to consist of the following: (1) residual soil, (2) the weathered upper bedrock surface of the Conasauga Limestone, and (3) hard rock with little secondary porosity. Bedrock in the north end of the main plant area in the SWMU 38 and 39 area is generally deeper than in the rest of the site. Seismic data indicates variable weathering of the top of the Conasauga Formation has occurred and often several feet of relief is developed over tens of feet.

A total of four anomalous areas of high conductivity, labeled E, F, G, and H were observed in the EM-31 and resistivity data. Anomalies E and F are in the area formerly occupied by SWMU 24 and higher conductivities in this area may be a result of the presence of minor amounts of flue dust material beneath the road not removed during realignment of Summit Road. Anomaly G is only present in the shallow data and coincides with the overhead contact cooling water pipeline. Anomaly H is present in both the shallow and deep data and is thought to be due to the presence of conductive sludge (flue dust) material in the subsurface at this location.

In the vicinity of SWMUs 38 and 39, the observed groundwater elevations in the upper Conasauga Formation range from 516.13 to 552.59 ft amsl and the groundwater flow direction is to the northeast toward Five Mile Creek. Hydraulic conductivities calculated from slug tests performed in the upper portion of the Conasauga Formation range from 4 x 10^{-8} to 7 x 10^{-2} cm/sec and calculated groundwater flow velocities range from 0.1 to 9000 ft/year.

The observed potentiometric surface elevations in the lower Conasauga Formation range from 516.13 to 552.59 ft amsl and the groundwater flow direction appears to be to the south. Hydraulic conductivities at SWMUs 38 and 39 in the lower, less permeable portions of the Conasauga Formation range from 1 x 10^{-7} to 2 x 10^{-7} cm/sec at MW-34D and calculated groundwater flow range from 0.3 to 0.6 ft/year at MW-34D.

One SVOC, benzo(k)fluoranthene, 10 of the 13 PP metals, and cyanide were detected in sludge samples collected from SWMU 39. Barium and cadmium were detected in TCLP sludge samples but concentrations were below RCRA TC levels.

One VOC, toluene, 10 of the 13 PP metals, and cyanide were detected in subsurface soil samples collected from SWMUs 38 and 39. Detected toluene and PP metals, except arsenic and beryllium, and cyanide concentrations were below USEPA Industrial RBCs in all samples. Arsenic and beryllium were detected above USEPA Industrial RBCs; however, concentrations were within the range observed in background soil samples. The presence of arsenic in the background samples and the fact that arsenic was not detected in TCLP sludge samples collected from SWMU 39 suggests the arsenic in subsurface soils at SWMU 39 is not derived from the sludge.

Five VOCs, six PP metals, and cyanide were detected in groundwater samples collected at SWMUs 38 and 39. Benzene and lead were above USEPA MCLs in groundwater samples collected in the deep water-bearing zone of the Conasauga Formation. Silver exceeded the USEPA MCL in one monitor well in the upper Conasauga. Cyanide was detected in six of the eight groundwater samples collected at SWMU 39; however, cyanide was not detected in groundwater samples collected from SWMU 38.

4.3.7 Conclusions

Since detected concentrations of arsenic and beryllium in subsurface soils and benzene, lead, silver, cyanide in groundwater at SWMUs 38 and 39 exceeded RBCs for surficial soil and USEPA MCLs, a risk evaluation is appropriate for this SWMU.

5.0 BASELINE RISK ASSESSMENT

A baseline risk assessment was conducted for the Land Disposal Areas following USEPA Region IV Guidance (USEPA, 1996a). Four SWMUs (SMWUs 23, 24, 38, and 39) were included in the evaluation of the Land Disposal Areas. The purpose of a baseline risk assessment is to determine the potential risk to human health and the environment posed by chemical constituents detected at the site. The analytical data presented in Section 4 of this report were used to conduct the risk assessment.

5.1 DATA ANALYSIS

Constituents of potential concern (COCs) were selected according to USEPA (1996a) criteria by comparison of maximum concentrations to risk-based screening levels and to twice background concentrations. Background data for soil were presented in Table 2-1. The USEPA Region III RBCs (1997a) used for screening were obtained directly from the table for carcinogens and adjusted to a level equivalent to a hazard quotient (HQ) of 0.1 for non-carcinogens (USEPA, 1996a).

Soil, sludge, and groundwater samples were collected from the four SWMUs associated with the Land Disposal Areas. The analytical data were evaluated following the guidelines provided by the USEPA (1989b; 1996a) for use in the risk assessment as described below:

- All constituents never detected in the samples were eliminated from further analysis for that group.
- For non-detects, one-half the sample quantitation limit (SQL) was used as a surrogate concentration (rather than using zero or eliminating the data point).

The results of the statistical analyses are presented in the constituent occurrence tables for the four SWMUs. The data were divided based on geographical location as seen in Figure 1-2 with SWMUs 23 and 24 evaluated individually and SWMUs 38 and 39 evaluated together. The information in the constituent occurrence tables (Tables 5-1 through 5-8) includes, for each detected constituent, the frequency of detection (ratio of the number of detections to the total number of samples in that group), the range of SQLs used to calculate surrogate concentrations for non-detections in the statistical calculations, the range of detected values, the average detection, the arithmetic mean (using surrogate concentrations for non-detections) assuming a log-normal distribution, the 95 percent upper confidence level (UCL) on the mean, and the exposure point concentration (EPC). Tables 5-1 and 5-2 summarize the data collected for subsurface soil and sludge at SWMU 23, respectively. At SWMU 24, surficial soil and sludge data were collected and are summarized in Tables 5-3 and 5-4, respectively. Subsurface soil data for SWMUs 38 and 39 are summarized in Table 5-5, while sludge data for SWMU 39 are provided in Table 5-6. Groundwater data are summarized in Tables 5-7 and 5-8 for SWMU 23 and SWMUs 38 and 39, respectively. Groundwater data were not available for SWMU 24.

5.1.1 Soil/Sludge

Constituents detected in soil and sludge were divided into chemical classes of PAHs, VOCs, SVOCs, and inorganics. The PAHs were divided further into carcinogenic and non-carcinogenic classes. To identify the COCs, the maximum detected concentration of each constituent in the surficial soil and sludge samples was compared to residential screening values for soil ingestion determined at a cancer risk level of 10^{-6} or a hazard quotient (HQ) of 0.1 following USEPA (1996a) guidelines. Maximum concentrations in subsurface soil samples were compared to industrial screening values for soil ingestion at the same 10^{-6} and 0.1 risk levels. Those constituents that exceeded the residential screening values or industrial screening values were identified as COCs. Additionally, if one compound in any chemical class (except for inorganics) exceeded the screening levels and was identified as a COC, all compounds in that chemical class became COCs. For example, if chrysene, a potentially carcinogenic PAH, were detected below its RBC, it would still be included as a COC if other potentially carcinogenic PAHs were detected above their RBCs. Table 5-9 presents the results of the selection of COCs for subsurface soils for SWMU 23, and arsenic was identified as the only COC. The COCs for sludge for SWMU 23 are presented in Table 5-10 and include carcinogenic PAHs and five inorganics.

The surficial soil and sludge COCs for SWMU 24 are identified in Tables 5-11 and 5-12, respectively. The carcinogenic PAHs and four inorganics (antimony, beryllium, cadmium, and chromium) were selected as COCs. The sludge COCs included the four surficial soil inorganics as well as lead and zinc.

Only one constituent (beryllium) was identified for the subsurface soil at SWMUs 38 and 39, as seen in Table 5-13. Table 5-14 summarizes the criteria for COC selection for the sludge for SWMUs 38 and 39. The COCs selected are antimony, beryllium, cadmium, and zinc. The list of COCs by SWMU for each medium is presented in Table 5-15.

5.1.2 Groundwater

VOCs and inorganics were detected in the groundwater. Groundwater is not a medium of concern since it is not used as a potable water supply. Therefore, COCs were not selected for groundwater.

5.2 TOXICITY ASSESSMENT

This section discusses the two general categories of toxicity values (non-carcinogenic and carcinogenic) used to evaluate risk. Toxicity values for non-carcinogenic and carcinogenic effects were obtained from the USEPA's Integrated Risk Information System (IRIS) (1997) and USEPA's Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997b).

5.2.1 Non-Carcinogens

The reference dose (RfD) is an estimate of a daily exposure level that is unlikely to cause non-carcinogenic health effects. Thus, exposure levels below the RfD are unlikely to produce toxic effects in even sensitive subpopulations. Chronic RfDs are used to assess long-term exposures ranging from 7 years to a lifetime; subchronic RfDs evaluate the potential of adverse health effects associated with exposure to chemicals during a period of 2 weeks to 7 years. RfDs are derived by the USEPA by dividing the no observed adverse effect levels (NOAELs) or lowest observed adverse effect levels (LOAELs) by uncertainty factors typically ranging from 10 to 10,000 depending on the suitability and quality of the available data.

RfDs that are approved by the USEPA are called verified reference doses for oral exposure (RfD_os) and reference concentrations (RfCs) for inhalation exposure. Table 5-16 presents the RfDs and RfCs used in this risk assessment. Target sites affected by each constituent are shown in the table for both inhalation and oral exposures. The confidence level and uncertainty factors associated with the toxicity values also are listed. The uncertainty factor represents a specific area of uncertainty inherent in the extrapolation from the available data. The confidence levels (low, medium, and high) assess the degree of confidence the USEPA has in the database used to develop the toxicity value.

Toxicity values for dermal exposure are not available (appropriate toxicity data are scarce); therefore, the oral RfDs are adjusted to an absorbed dose, using the constituent-specific oral absorption efficiency, as recommended by the USEPA (1989b). This correction is necessary due to the differences in absorption between the skin and the gastrointestinal (GI) tract. In calculating a dermal RfD from an oral RfD, the oral RfD is multiplied by the oral absorption efficiency.

5.2.2 Carcinogens

Constituents are classified as known, probable, or possible human carcinogens based on the USEPA weight-of-evidence scheme in which chemicals are systematically evaluated for their ability to cause cancer in humans or laboratory animals. The USEPA classification scheme (USEPA, 1989b) contains six classes (five if B1 and B2 are classified together under the heading of Class B), based on the weight of available evidence, as follows:

- A Known human carcinogen;
- B1 Probable human carcinogen -- limited evidence in humans;
- B2 Probable human carcinogen -- sufficient evidence in animals and inadequate data in humans;
- C Possible human carcinogen -- limited evidence in animals;
- D Inadequate evidence to classify; and
- E Evidence of non-carcinogenicity.

Constituents in Classes A, B1, B2, and C generally are included in risk assessments as potential human carcinogens; however, Class C carcinogens may be evaluated on a case-by-case basis (USEPA, 1989b). In this risk assessment, the Class C carcinogens were evaluated with the Class A and B carcinogens.

The USEPA currently uses the linearized multistage model for extrapolating cancer risk from high doses associated with occupational exposure or laboratory animal studies to low doses typically associated with environmental exposures. The model provides a 95 percent upperbound estimate of cancer incidence at a given dose. The slope of the extrapolated curve, called the cancer slope factor (CSF), is used to calculate the probability of cancer associated with the exposure dose. Inhalation exposures are evaluated using the unit risk factor (UR_i).

CSFs are derived from the assumption that any dose level has a probability of causing cancer. The cumulative dose, regardless of the exposure period, determines the risk; therefore, separate CSFs are not derived for subchronic and chronic exposure periods. Table 5-17 presents the CSFs and UR_is used in this report. Target sites affected by the COCs and the USEPA cancer classifications of the COCs are shown. The oral CSF is adjusted to evaluate dermal exposures (Table 5-17). This is done by dividing the oral CSF by the oral absorption efficiency. The oral and dermal absorption efficiencies are shown in Table 5-18, and the adjusted values are shown in Table 5-19.

5.2.3 Toxic Effects Summary

Toxicity values for the COCs were identified in the previous section. COCs include seven carcinogenic PAHs, antimony, arsenic, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, and zinc. This section presents a brief summary of the known toxic effects of the COCs and the basis for their toxicity values.

Most of the toxicity data derived from humans come from occupational, accidental, or intentional exposures. Epidemiological studies of human populations which are adequate to derive toxicity values are limited to a few chemicals. In most epidemiological studies, it is difficult to determine the exposure conditions (i.e., concentrations, frequency, duration, etc.); the number of exposed individuals is small; the incidence of the effect is small; and exposure to multiple chemicals may have occurred. Therefore, data derived from laboratory animal studies frequently are used to extrapolate potential risks to humans. Although reliance on laboratory animal studies increases the uncertainty associated with risk estimates, modern toxicology is built on the premise that the toxic effects of chemical agents are similar for laboratory animals and humans. The weight of evidence increases when similar results are observed in both sexes, more than one species of laboratory animal, across various routes of exposure, and case reports from human exposures.

5.2.3.1 PAHs

PAHs are found throughout the environment from both natural and anthropogenic (man-made) sources. These compounds are closely related chemically and have similar toxic effects; however, not all of the PAHs are thought to be carcinogenic. Benzo(a)pyrene is the only carcinogenic PAH for which the USEPA has developed a CSF. The current recommendation from USEPA is to estimate risk for other PAHs based on structure-activity relationships relative to benzo(a)pyrene. The risk estimates are conducted by converting the CSF and UR_i for benzo(a)pyrene by a toxicity equivalency factory (TEF). Although several epidemiological studies have linked human exposure to mixtures of PAHs containing benzo(a)pyrene to lung cancer, the studies are not sufficient to determine that benzo(a)pyrene or any other PAH is responsible. Numerous animal studies have been conducted to investigate the carcinogenicity of benzo(a)pyrene. These include inhalation, dietary, gavage, dermal, and other studies involving guinea pigs, hamsters, rats, mice, and several primates. Tumors generally are produced at the site of administration; however, tumors at distant sites have been reported. The most common tumor sites include the stomach, lungs, and skin. The current oral CSF of 7.3 kilogram-day per milligram (kg-day/mg) is based on the geometric mean of slope factors derived from four studies (IRIS, 1997). USEPA Region IV (1996a) provided a UR_i of 0.88 milligrams per cubic meter $(mg/m^3)^{-1}$.

An RfD has not been derived for the carcinogenic PAHs. However, the RfD for pyrene is used as a surrogate. Reported noncarcinogenic effects of PAHs in laboratory animals include dermatitis, skin sensitization to sunlight, immunosuppression, reproductive and developmental effects, liver, kidney, and gastrointestinal tract at concentrations ranging from 10 milligrams per kilogram per day (mg/kg/day) to more than 100 mg/kg/day (Agency for Toxic Substances and Disease Registry [ATSDR], 1989).

5.2.3.2 Antimony

Antimony production has been associated with an increase in lung cancer among exposed workers (NIOSH, 1978), and one inhalation study in rats also indicated that antimony tiroxide might produce lung and liver tumors (ACGIH, 1980; USEPA, 1980). Several studies in bacterial test systems report that various antimony compounds, including antimony trioxide, antimony trichloride, and antimony pentachloride, may be mutagenic. Reports of effects on reproduction are limited. Among the effects on reproduction reported for humans is impairment of the female reproductive system. Female workers exposed to metallic antimony dust, antimony trioxide, and antimony pentoxide had an increased incidence of gynecological disorders and late spontaneous abortions. Antimony was found in the breast milk, placental tissue, amniotic fluid, and blood of the umbilical cord in exposed workers. Decreased weight gain was observed in children born of workers exposed to antimony. The same paper reports a study in which intraperitoneal administration of antimony produced changes in rats that support the findings of human reproductive effects.

Cardiovascular changes associated with exposure to antimony represent a serious health effect. Exposure to either trivalent or pentavalent antimonial compounds can produce electrocardiogram (ECG) changes in humans. Histopathological evidence of cardiac edema, myocardial fibrosis, and other signs of myocardial structural damage indicates that antimony may produce even more severe, possibly permanent, myocardial damage in humans. Parallel findings of functional changes in ECG patterns and of histopathological evidence of myocardial structural damage have also been obtained in animal toxicity studies. Pneumoconiosis in response to inhalation exposure and dermatitis in response to skin exposure also may have been observed among individuals exposed to antimony or its compounds.

USEPA (IRIS, 1997) calculated an RfD of 0.0004 mg/kg/day based on a study showing altered blood chemistry in rats orally dosed with antimony.

5.2.3.3 Arsenic

Arsenic is a naturally-occurring element and may be found in soil, water, food, and air. Normal, or background, exposure from these sources is estimated at about 50 micrograms per day (ug/day). Food is the largest background source under most circumstances. Ingestion of as little as 50 milligrams (mg) to 300 mg can be fatal to humans. Lower levels have caused gastrointestinal distress (nausea, vomiting, and diarrhea), loss of appetite, hair and weight loss, and irritation of mucous membranes. Long-term exposure to arsenic is known to cause damage to the nervous system, blood vessels, and skin. Arsenic is known to be a human carcinogen. Cancer of the skin, lungs, liver, kidney, and bladder have been associated with human exposures to arsenic. Arsenic has not been shown to be carcinogenic in laboratory animals. An oral RfD, oral CSF, and UR_i have been developed by USEPA (IRIS, 1997). All of the toxicity values were based on human epidemiological studies.

The oral RfD was developed from a study of Taiwanese populations exposed to naturally-occurring arsenic in water-supply wells. The mean concentration of arsenic in the low-dose group was 9 ug/L and was identified as the NOAEL. The mean arsenic concentration in the LOAEL group was 170 µg/L. The most sensitive effects included darkening of the skin, thickening of the skin of the palms and soles, and the appearance of "corns" or "warts" on the hands, feet, and body. In extreme cases, blood vessel damage may lead to gangrene of the feet (called blackfoot disease). Based on an assumed water consumption rate of 4.5 liters per day (L/day), background exposure to 0.002 mg of arsenic per day in food, and an average body weight of 55 kilograms (kg), the arsenic concentration in the NOAEL group was converted to 0.0008 mg/kg/day and divided by an uncertainty factor of 3 to derive the RfD of 0.0003 mg/kg/day. The uncertainty factor was selected to account for the lack of data on reproductive effects and to account for individuals who may be more sensitive than those included in the study. Overall, the USEPA has assigned a medium confidence level to the RfD. Although more than 40,000 people were included in the study, exposures were not well characterized and other contaminants were present.

The CSF for arsenic was based on the same epidemiological studies as the RfD, and skin cancer was the tumor type evaluated. The UR_i was derived from epidemiological studies of smelter workers which showed a statistically increased incidence of lung cancer in these workers.

5.2.3.4 Beryllium

The lung and skin are the primary organs affected by beryllium exposure. Contact with the skin can cause rashes and nodules to develop in people who are allergic to beryllium. If beryllium gets embedded under the skin, an ulcer can develop. However, it is unlikely that beryllium is absorbed through the skin (ATSDR, 1997). Inhalation of soluble beryllium compounds at concentrations greater than 0.1 mg/m^3 can result in a severe and immediate inflammation of the entire respiratory tract, including the nasal passages, pharynx, and lungs. Recovery generally is complete within a few weeks or months. Long-term exposure to beryllium compounds, particularly beryllium oxide, can result in a chronic granulomatous pulmonary disease called berylliosis. Symptoms include shortness of breath and, in severe cases, clubbing of the fingers. Pulmonary fibrosis develops as the disease progresses, leading to breathing difficulties. Inhalation of beryllium compounds has caused lung cancer in rats and monkeys. UR_i was derived based on epidemiological study despite some limitations to the study (IRIS, 1997). Risk estimates were derived based on a range of estimated exposure times and concentrations.

Toxic effects in humans from ingesting beryllium have not been reported, probably since very little beryllium is absorbed from the gastrointestinal tract. Toxicity of ingested beryllium in laboratory animals is limited. Rats fed diets containing from 10 to 240 mg/kg/day of beryllium carbonate developed rickets (ATSDR, 1991). An oral CSF was developed from a drinking-water study using rats. Although the study did not show a statistically significant increase in tumors, it was used because it was the only study available that used an oral exposure route. Oral CSFs derived by extrapolation from inhalation or intravenous exposure routes reportedly are within an order of magnitude (IRIS, 1997).

5.2.3.5 Cadmium

Cadmium bioaccumulates in humans, particularly in the kidney and liver (USEPA, 1985). Chronic oral or inhalation exposure of humans to cadmium has been associated with renal dysfunction, itai-itai disease (bone damage), hypertension, anemia, endocrine alterations, and immunosuppression. Renal toxicity occurs in humans at a renal cortex concentration of cadmium of 200 micrograms per gram (ug/g) (USEPA, 1985). In experimental animals, cadmium induces injection-site sarcomas and testicular tumors. When administered by inhalation, cadmium chloride is a potent pulmonary carcinogen in rats. Cadmium is a well documented animal teratogen (USEPA, 1985).

USEPA (IRIS, 1997) has classified cadmium as a B1 agent (probable human carcinogen). This classification applies to agents for which there is limited evidence of carcinogenicity in humans from epidemiologic studies. UR_i of 0.0018 cubic meters per microgram (m^3/ug) has been derived from cadmium based on epidemiologic studies. Using renal toxicity as an endpoint, an RfD of 1×10^{-3} mg/kg/day has been derived (IRIS, 1997) for exposures to cadmium in soil.

5.2.3.6 Chromium

The toxicity of chromium depends on the valence state of the compound. Hexavalent chromium is more toxic than trivalent chromium, which is an essential nutrient for fat and sugar metabolism. Ingestion of large amounts of hexavalent chromium salts can damage the digestive tract, kidneys, and liver. Occupational exposure to hexavalent chromium has been associated with lung cancer, skin ulceration, allergic dermatitis, and anemia. Laboratory studies also indicate that hexavalent chromium is mutagenic. Trivalent chromium does not cause these effects. As a conservative measure, all chromium is assumed to be hexavalent in this risk assessment. Toxicity values discussed below apply to hexavalent chromium.

The RfD was derived from a 1-year drinking study in rats. The NOAEL was 2.4 mg/kg/day (derived from a concentration of 25 mg/L of potassium chromate in drinking water). No concentrations higher than 25 mg/L were given; therefore, a LOAEL was not identified. An uncertainty factor of 500 was used to derive the RfD of 0.005 mg/kg/day. Factors of 10 were used to compensate for interhuman and interspecies variability in sensitivity, and a factor of 5 was used to compensate for less than lifetime exposure. Confidence in the RfD was rated as low because of the small number of animals used in the study, small number of parameters measured, failure to identify a LOAEL, poor quality of supporting studies, and insufficient data for teratogenic or reproductive endpoints.

Inhalation of hexavalent chromium compounds may cause lung cancer; however, ingested hexavalent chromium is not considered to be carcinogenic. The inhalation unit risk factor of 1.2×10^{-2} m^3/ug was derived from occupational epidemiological studies. Dose-response relationships for chromium exposure and lung cancer have been consistent across several studies (IRIS, 1997).

5.2.3.7 Lead

Lead is known to cause many toxic effects depending on the exposure circumstances. The principal toxic effects include damage to the nervous system, blood-forming system, kidneys, and reproductive system. Some lead compounds have caused kidney cancer in rats and mice; however, data are insufficient to determine if lead causes cancer in humans. The fetus and young children are particularly susceptible to lead because of greater absorption and sensitivity of the developing nervous system. Lead exposure can cause decreased mental ability, premature birth, and reduced growth rates in children. For adults, an increase in blood pressure is one of the most sensitive effects.

Risk assessment for lead does not rely on the standard toxicity values (RfDs and CSFs); instead, the USEPA (1996b) has developed various models which are used to predict levels of lead in the blood following various exposures. These models were designed to protect the fetus and young children as the most sensitive receptors. Current data indicate that children may be affected by lead at blood lead levels of 10 micrograms per deciliter (ug/dL) of blood or lower, which, historically, is below average "background" levels in the general population. Severe brain damage, anemia, and kidney damage can occur when blood lead levels exceed 80 ug/dL in children or 80 to 100 ug/dL in adults (Goyer, 1991). Damage to the peripheral nervous system can occur at concentrations of 40 ug/dL, and concentrations greater than 30 ug/dL may permanently lower intelligence quotient (I.Q.) scores of children. The nervous system of the developing fetus may be damaged at concentrations in the 10 to 15 ug/dL range.

5.2.3.8 Mercury

In humans, elemental and inorganic mercury are absorbed following inhalation exposure but are poorly absorbed following oral exposure (ATSDR, 1997). Occupational exposure of workers to elemental mercury vapors (0.1 to 0.2 mg/m^3) has been associated with mental disturbances, tremors, and gingivitis (ATSDR, 1997). The central nervous system is a major target for organic mercury compounds. Adverse effects in humans from exposure to organic mercury compounds have included destruction of cortical cerebral neurons, damage to Purkinje cells, and lesions of the cerebellum. Clinical symptoms following exposure to organic mercury compounds have included paresthesia, loss of sensation in extremities, ataxia, and hearing and visual impairment (World Health Organization [WHO], 1976). A primary target organ for inorganic compounds is the kidney. Human exposure to inorganic mercury compounds has been associated with anuria, polyuria, proteinuria, and renal lesions (Hammond and Beliles, 1980).

Embryotoxic and teratogenic effects, including malformations of the skeletal and genitourinary systems, have been observed in animals exposed to organic mercury (ATSDR, 1997). Both organic and inorganic compounds are reported to be genotoxic in eukaryotic systems (Leonard et al., 1984).

USEPA has categorized mercury as a Class D agent. This classification applies to those agents for which there is inadequate evidence of carcinogenicity in animals. The RfD for inorganic mercury is under review by USEPA. The inhalation RfC for inorganic mercury is 3×10^{-4} mg/m^3.

5.2.3.9 Nickel

Nickel from refinery dust has been classified as a Class A human carcinogen by the USEPA. Numerous studies have proven a statistically significant increase in nasal and lung cancers for workers exposed to nickel dust. Although animal studies have not been as conclusive (some species of rats and mice show no response), some studies have shown increased incidents of sarcomas. The inhalation UR_i for nickel as refinery dust is 2.4×10^{-4} m^3/ug. The oral RfD for nickel is based on decreased body weight for rats exposed to nickel (as soluble salts). An uncertainty factor of 300 is related with the oral RfD of 0.02 mg/kg/day, and confidence is medium.

5.2.3.10 Selenium

There is no evidence that selenium is carcinogenic in humans (IRIS, 1997). Selenium has been tested by the oral route in experimental animals, but the available data are insufficient to allow unequivocal evaluation of its carcinogenic potential. However, recent reports suggest that selenium is not carcinogenic. Several studies have shown that selenium may actually reduce the incidence of tumors under certain conditions.

Selenium is an essential element in animals and humans (ATSDR, 1997). However, exposure to amounts only slightly above the required levels can produce acute and chronic toxic effects. Acute toxicities of selenium compounds vary greatly, while the chronic effects of most forms are similar. Exposure may be by oral, inhalation, or dermal routes, and effects in humans and experimental animals are similar. Acute effects include degeneration of the liver, kidneys, and myocaria; hemorrhages in the digestive tract; and brain damage. Eye, nose, and throat irritation also may occur with inhalation exposure. The acute oral lethal dose (LD_{50}) value of sodium selenite in rats was approximately 10 mg/kg. Chronic toxicity in humans appears to occur only in areas where foods containing excessive concentrations of selenium are ingested. Signs of chronic intoxication include depression, nervousness, dermatitis, gastrointestinal disturbances, dental caries and discoloration, lassitude, and partial loss of hair and nails.

5.2.3.11 Zinc

Zinc (Zn) is an essential nutrient, with a recommended daily allowance of 5 to 15 milligrams per day (mg/day). However, large doses seem to produce copper deficiency anemia. A 10-week study of women taking 50 mg Zn/day resulted in a decrease of erythrocyte superoxide dismutase (ESOD), a decline in ferritin and hematocrit values, and an increase in zinc serum. The same study in men also showed a decrease in ESOD. People with sickle cell anemia exposed to zinc experience copper deficiency. Zinc does seem to lower high density lipid (HDL) cholesterol.

Carcinogenic studies for zinc are inadequate, and the USEPA has identified zinc as not classifiable as to human carcinogenicity. Some laboratory studies indicate an increase in hepatomas in mice exposed to zinc in drinking water. Some fowl have developed testicular testoma when injected with 0.01 grams (g) of zinc acetate or zinc stearate.

5.3 EXPOSURE ASSESSMENT

Exposure assessments typically rely on standard default assumptions developed by USEPA or state regulatory agencies because actual exposure data typically are not available and are difficult to obtain. Because of this fact, there is a great deal of uncertainty associated with exposure estimates. In order to compensate for this uncertainty, reasonable maximum exposure (RME) assumptions are used. The RME is defined as the maximum exposure that is reasonably expected to occur at the site; therefore, actual exposures are likely to be less than the RME. Standard default exposure assumptions have been developed for residential and industrial exposure scenarios. However, site-specific data and professional judgment also are important components of the exposure assessment. Both were incorporated in the risk assessment.

5.3.1 <u>Exposure Setting</u>

SWMU 23 was used to store waste materials from the BTF and Chemical Manufacturing Plant; SWMUs 24 and 39 were used to store waste materials from the former Blast Furnace Plant; and SWMU 38 was used to store construction debris, soil from excavation activities, and other debris. The SWMUs are in a relatively isolated portion of the entire Facility. Activities at the Land Disposal Areas range from waste mining to nothing. SWMU 23 is not visited on a regular basis by Sloss workers. The use of these SWMUs is not expected to change for the foreseeable future. Activity on the site is limited to site workers, and site access is controlled by a locked gate and 24-hour guard. The surrounding property is mixed industrial and residential. Groundwater is not used as a water supply on the site or in the site vicinity. Surface water on the site is limited to a drainage ditch along the eastern property boundary; storm water drainage ditches along Summit Street, the polishing pond (SWMU 22) just north of SWMU 24; and the Stormwater Runoff Sewer (SWMU 25) west of SWMU 38. SWMUs 22 and 25 will be investigated as part of the BTF and Sewers RFI.

5.3.2 Conceptual Site Exposure Model

The conceptual site exposure model provides the framework of the risk assessment. It characterizes the exposure setting, identifies sources and transport pathways for the COCs, identifies potential receptors for current and future land uses, and identifies the primary exposure routes (Figure 5-1). Receptors may include any living organism (human, plant, or animal). Exposure routes include the basic pathways through which a COC may be absorbed (inhalation, oral ingestion, or dermal contact).

An exposure pathway evaluation is a key component of a risk-based analysis. Exposure can occur only when the potential exists for a receptor to directly contact released constituents or if there is a mechanism for released constituents to be transported to a receptor. Each component (released constituents, mechanism of transport, point of contact, and presence of a receptor) must be present for a complete exposure pathway.

This report focuses on the SWMUs (23, 24, 38 and 39) associated with the Land Disposal Areas that are located at the northern portion of the Sloss Facility. The Sloss Facility currently manufactures foundry and furnace coke through the process of carbonization at the Coke Manufacturing Plant, TSA and BSC at the Chemical Manufacturing Plant, and mineral wool. Access is controlled by a fence and gate which is manned by security guards 24 hours per day.

SWMUs in the Land Disposal Areas are not used currently for disposal of plant wastes, and there are no plans to reuse these portions of the Sloss property. SWMU 23 is isolated and overgrown; no one contacts the material stored there. The sludge from SWMU 24 is being mined and sold as product and SWMU 39 will be mined in the future. A metals recovery operation was performed on SWMU 38 and the landfill is still being used for disposal of construction debris and soil from excavation activities. Site workers, including construction or excavation workers, may be exposed to COCs in surficial soils, subsurface soil, sludge, and ambient air. Incidental ingestion, dermal contact, and inhalation of dust and vapors are the exposure routes, with the exception of beryllium. Beryllium is not absorbed through intact skin (ATSDR, 1997); therefore, assessing dermal contact with beryllium is not appropriate. Off-site transport of the COCs is expected to be minimal compared with on-site concentrations; therefore, on-site workers represent the receptors with the greatest exposure potential.

Groundwater exposure is not evaluated in this risk assessment because it is not used as a potable water supply at the site or in the surrounding area. The area is supplied with water by the municipal water district.

5.3.2.1 Release Sources and Release Mechanisms

The release sources and release mechanisms can be divided into two groups: primary and secondary. Primary release sources are those sources that initially release the COC(s). Secondary release sources are those sources that were impacted by the primary source and can cause an additional release of the COC(s). Potential release sources include the SWMUs identified at the Land Disposal Areas.

The soil and sludge from each SWMU are potential sources of release to the air and surrounding soil. Particulates and vapors that contain the COCs from operations are released into the atmosphere where they then have the potential of settling to the surficial soil or may be transported off-site. Surficial soil usually is defined as the soil between land surface and 1 foot below land surface (bls). Once in the surficial soil, the COC may either migrate into the subsurface soil and subsequently leach into the groundwater or be released via vapors and dust into the atmosphere. The concentrations of constituents detected in groundwater are relatively low, indicating the subsurface migration to groundwater pathway is not significant. The physical and chemical properties influencing constituent migration are presented in Table 5-20.

5.3.2.2 Exposure Points, Exposure Routes, and Receptors

Exposure points are the specific locations where a receptor may contact constituents in soil, groundwater, or other environmental media. Impacted surficial and subsurface soil and sludge at the Land Disposal Areas are the exposure points. As previously discussed, groundwater is not considered an exposure point. There are no water-supply wells within the vicinity of the site. The residential area located next to the Facility is on a municipal water supply; therefore, it is highly unlikely that the shallow groundwater would ever be used as a water supply in the future near the site. Therefore, groundwater is not considered an exposure pathway of concern for the Land Disposal Areas.

It is anticipated that on-site exposure routes under current and future conditions will be limited to site workers. Exposure routes examined include incidental ingestion, dermal contact, and inhalation of dusts and vapors. Contact with subsurface soil in the SWMUs would occur only if future construction projects were conducted in these areas.

Off-site residents may be exposed to the constituents in soil via inhalation. Due to the distance to the nearest residence and the expected low releases to air due to the extensive cover over the area, off-site residential exposure is expected to be minimal compared to potential on-site worker exposure. Therefore, off-site resident inhalation is not considered an exposure pathway of concern for the Land Disposal Areas. The potential exists for birds and small terrestrial animals to be exposed to the COCs in soil via ingestion; however, the industrial nature of the site is a limiting factor for ecological receptors.

5.3.3 Exposure Assumptions

Standard exposure assumptions (USEPA, 1989b; 1996a) for industrial workers were used in this risk assessment for the Land Disposal Areas. These values are summarized in Table 5-21. No specific guidance has been developed regarding exposure frequency and exposure duration for an excavation worker. Therefore, professional judgment was used. The excavation worker exposure scenario is based on a construction project that lasts 18 weeks (90 working days). Work is conducted 8 hours per day, 5 days per week.

Site workers are assumed to come in contact with impacted surficial soil (0 to 1 foot bls) and sludge in SWMU 24 and SWMUs 38 and 39 for 8 hours per day, 250 days per year, over a 25-year period (USEPA, 1989b; 1996a). Actual exposures under current conditions are expected to be much less than assumed in this risk assessment because workers do not spend 8 hours per day at either of the SWMUs. SWMU 23 is not active; therefore, site workers are assumed to come in contact with sludge in SWMU 23 only during periodic inspections of the SWMU. Inspections were assumed to last 2 hours per day, 12 days per year (once a month), over a 25-year period.

The EPCs for surficial soil, subsurface soil, and sludge, based on log-normal data distribution, are presented in Tables 5-1 through 5-6, as identified in the USEPA Region IV (1996a) guidance. The physical-chemical properties used to evaluate exposure are included in Table 5-20. Table 5-22 presents equations used to evaluate exposure and risk.

5.4 RISK CHARACTERIZATION

Risk characterization summarizes and combines information from the toxicity assessment and exposure assessment to derive quantitative or qualitative risk estimates. Risk estimates for the Land Disposal Areas are discussed in the following section.

5.4.1 Non-Carcinogens

Quantitative estimates for non-carcinogenic effects are called HQs. The HQ is the ratio of the estimated average daily exposure dose and the RfD for oral and dermal exposures, and the ratio of the estimated air concentration and the RfC for inhalation exposures. An HQ greater than 1 indicates only that the estimated exposure exceeds the RfD or RfC. It does not provide the probability of an adverse effect. Although an HQ greater than 1 indicates that the estimated exposure dose for that constituent exceeds the RfD or RfC, it does not necessarily imply that adverse health effects will occur. It is important to remember that all RfDs and RfCs and, consequently HQs, are not equal. The basis for the RfD/RfC and the confidence level should be considered in risk management decisions. The HQs are added to derive the hazard index (HI). Current regulatory methodology (USEPA, 1989b; 1996a) advises summing HIs across exposure routes for all media at the site to derive a "Total Site Hazard Index." If the total HI exceeds 1, COCs may be grouped according to critical toxic effects, and HIs may be calculated separately for each effect (USEPA, 1989b; 1996a).

5.4.2 Carcinogens

Quantitative estimates for carcinogenic effects are obtained by calculating the excess lifetime cancer risk (ELCR). Estimated average daily doses, or intakes, for each constituent are averaged over the expected lifetime of 70 years. The ELCR, equal to the product of the exposure dose and CSF or air concentration and the UR_i, is estimated for each known, probable, or possible carcinogenic COC in each medium. The ELCR values provided in this report are an indication of the increased risk, above that applying to the general population, which may result from the exposure scenarios described in the Exposure Assessment section (Section 5.3). The risk estimate is considered to be an upperbound estimate; therefore, it is likely that the true risk is less than that predicted by the model. Current regulatory methodology assumes that ELCRs can be summed across routes of exposure and COCs to derive a "Total Site Risk" (USEPA, 1989b; 1996a). The USEPA has a defined a target ELCR range of 1×10^{-6} to 1×10^{-4} (USEPA, 1996a). Risk levels within or below this range generally do not require remediation.

5.4.3 RME Risk Estimates

Site worker exposure was calculated for exposure to sludge for SWMUs 23, 24, and 39, and was calculated for exposure to surficial soil for SWMU 24. Construction worker exposure was calculated for exposure to subsurface soil in SWMU 23 and SWMUs 38 and 39. Surficial soil and sludge data were used to evaluate current exposure conditions for site workers, and subsurface soil data were used to evaluate future conditions for construction workers. The equations used in the calculations are presented in Table 5-22.

The ELCR and HI for site worker exposure to sludge in SWMU 23 (Table 5-23) were 1×10^{-5} and 0.01, respectively. The major contributor to the ELCR is benzo(a)pyrene. The ELCR and HI for construction worker exposure to subsurface soil in SWMU 23 (Table 5-24) were 8×10^{-7} and 0.1, respectively. The ELCR for site worker exposure is within the target range of 1×10^{-6} to 1×10^{-4}, and the ELCR for construction worker exposure is below the target range. The HIs for both site worker and construction worker exposure are below the target of 1.

The ELCR and HI for site worker exposure to surficial soil in SWMU 24 (Table 5-25) were 4×10^{-5} and 0.2, respectively. The major contributor to the ELCR is benzo(a)pyrene. The ELCR and HI for site worker exposure to sludge in SWMU 24 (Table 5-26) were 2×10^{-6} and 0.6, respectively. The major contributor to the ELCR is beryllium. The ELCRs are within the target range of 1×10^{-6} to 1×10^{-4}, and the HIs are below the target of 1.

The ELCR and HI for site worker exposure to sludge in SWMU 39 (Table 5-27) were 2×10^{-6} and 0.5, respectively. The main contributor to the ELCR is beryllium. The ELCR and HI for construction worker exposure to subsurface soil in SWMUs 38 and 39 (Table 5-28) were 8×10^{-8} and 0.0003, respectively. The ELCR for site worker exposure is within the target range of 1×10^{-6} to 1×10^{-4}, and the ELCR for a construction worker is below the target range. The HIs for both site worker and construction worker exposures are below the target of 1.

5.5 RISK-BASED REMEDIAL GOAL OPTIONS

Risk-based remedial goal options (RGOs) are provided in this section for the exposure scenarios where the ELCR exceeded 1×10^{-6}. RGOs for non-carcinogenic risks are unnecessary because all of the HQs and HIs were below 1. RGOs are presented at target risk levels corresponding to 10^{-4}, 10^{-5}, and 10^{-6} according to USEPA (1996a) guidelines. The RGO equations are presented in Table 5-29.

RGOs for exposure to COCs in sludge in SWMU 23 are presented in Table 5-30. RGOs for COCs in SWMU 24 and SWMUs 38 and 39 are presented in Table 5-31, with the exception of lead. Lead does not have a RfD or CSF because risks from lead exposure are better evaluated by predicting the associated blood lead level. The approach used here relates intake of lead from soil to blood lead concentrations in women of child-bearing age (USEPA, 1996b). Because the fetus and young children are much more susceptible to lead toxicity than adults, an RGO is developed which protects the fetus as described below.

The USEPA model assumes that the increase in blood lead from exposure to soil lead is linear. A linear biokinetic slope factor was developed for the model. It is based on available data relating fetal blood lead levels to maternal blood lead levels and soil exposure. In the guidance, USEPA (1996b) states that the basis for the RGO is the assumption that "fetuses and neonates can be adversely affected by elevated maternal blood lead concentrations, and that risk to the fetus can be estimated from the probability distribution of fetal blood lead concentrations." The baseline maternal blood lead concentrations were estimated based on the background blood lead level in the general population which ranges from about 1.7 to 2.2 ug/dL. The highest acceptable fetal blood lead level was set at be 10 ug/dL, the recommended concentration from the USEPA and the Centers for Disease Control (CDC). From the equations shown in Table 5-32, an RGO for lead of 1,400 mg/kg was calculated.

EPCs for each SWMU are included in Tables 5-30 and 5-31. In comparing the EPCs with the calculated RGOs, none of the constituent EPC concentrations exceeded the RGO at a 1×10^{-4} risk level. Only the benzo(a)pyrene EPC concentrations exceeded a 1×10^{-5} risk level. The benzo(a)pyrene EPC in SWMU 24 surficial soil is 7.3 mg/kg, while the RGO is 2.4 mg/kg. The RGO concentrations that exceed the EPCs are highlighted in each table. The lead EPC is above the calculated RGO for sludge in SWMU 24.

5.6 UNCERTAINTIES

5.6.1 Sources of Uncertainty

The risk estimates presented here are conservative estimates of the risks associated with exposure to constituents detected in soil at the site In general, conservative assumptions were made in the risk assessment process to bias the risk assessment towards protectiveness. However, uncertainty is inherent in the risk assessment process, and a discussion of these uncertainties is presented in this section. Each of the three basic building blocks for risk assessment (monitoring data, exposure scenarios, and toxicity values) contribute uncertainties.

Uncertainty always exists when using a finite set of monitoring data to represent site conditions. Because of this uncertainty, the UCL or maximum detected concentration was used to represent the EPC for each constituent in each medium. This conservative approach should bias the risk estimates to overestimate actual risks that might be associated with the site. In addition, it was assumed that the constituent concentrations remain constant throughout the relevant exposure periods, ignoring natural attenuation processes that should tend to decrease the concentrations over time. This conservative assumption is expected to generate highly protective (elevated) risk estimates.

Environmental sampling itself introduces uncertainty. This source of uncertainty can be reduced through a well-designed sampling plan, use of appropriate sampling techniques, and implementation of laboratory data validation and quality assurance/quality control (QA/QC). The data used in this report meet QA/QC requirements and are appropriate for use in a risk assessment. Although only a few samples were collected at each SWMU, the samples were collected in areas near the potential release sources and should generally reflect the highest concentrations. Again, this sampling bias should overestimate risk.

Exposure scenarios also contribute uncertainty to the risk assessment. Exposures were calculated based on the assumption that the current conditions would remain stable (i.e., no attenuation) throughout the exposure period. This assumption can produce uncertainties because natural attenuation processes are expected to substantially reduce constituent concentrations over time. Exposure scenarios were developed based on site-specific information, USEPA exposure guidance documents, and professional judgment. Although uncertainty is inherent in the exposure assessment, the exposure assumptions also were chosen to err on the side of conservatism (i.e., to be over protective).

The toxicity values and other toxicological information (i.e., health effects) used in this report are associated with significant uncertainty. Many toxicity values are developed using results of studies in which laboratory animals are exposed to high doses. Although species differences in absorption, distribution, metabolism, excretion, and target organ sensitivity are well documented, available data are not sufficient to allow compensation for these differences. Most laboratory studies strictly control as many factors as possible, yet the human population is genetically diverse and affected by a variety of diets, occupations, pharmaceuticals, and other factors. When human epidemiological data are available, a different set of uncertainties is present. For instance, exposure dose is seldom well characterized in epidemiological studies.

Recent research on the mechanisms of carcinogenesis suggests that USEPA's use of the linearized multistage model may overestimate the cancer risks associated with exposure to low doses of chemicals (USEPA, 1996c). At higher doses, many chemicals cause large-scale cell alteration which stimulates replacement by cellular division. Dividing cells are more subject to mutations than quiescent or non-dividing cells; thus, there is an increased potential for tumor formation. It is possible that administration of these same chemicals at lower doses would not increase cell division and thus would not increase mutations. This would suggest that the current methodology may overestimate cancer risk, particularly given the low doses found at the site.

Toxicity values were not available from the USEPA for all of the COCs in media at the site. The USEPA is in the process of developing inhalation toxicity values; however, these currently are not available for most constituents. Surrogate compounds were selected to represent the toxicity values for some constituents lacking values if an appropriate surrogate was available. In the absence of subchronic RfDs, chronic RfDs were used.

5.6.2 Monte Carlo Analysis

Monte Carlo Analysis is one method used to approach the uncertainty involved in the point-estimate or deterministic risk assessment. The Monte Carlo or probabilistic method of risk assessment was used in this report to calculate total cancer risks for the following site worker exposure scenarios:

(1) site worker exposure to sludge for SWMU 23;
(2) site worker exposure to surficial soil for SWMU 24;
(3) site worker exposure to sludge for SWMU 24; and
(4) site worker exposure to sludge for SWMU 39.

These scenarios were selected for the Monte Carlo Analysis because the total excess lifetime cancer risks from the deterministic (i.e., point estimate) calculations exceeded the lower end (1 x 10^{-6}) of the range of acceptable risk values (10^{-6} to 10^{-4}). Only the cancer risks were included in the Monte Carlo Analysis since the deterministic non-cancer risks were all acceptable (i.e., HI less than 1). The following sections provide a brief description of Monte Carlo Analysis and present the exposure parameters used in the calculations.

Monte Carlo simulation is a tool which was developed by physicists over 50 years ago and has long been used by scientists and engineers in many fields. Application of Monte Carlo simulation produces a probability distribution for a modeled parameter based on the probability or uncertainty distributions for the input variables. To run a Monte Carlo simulation, an appropriate probability density function (PDF) must be defined for each selected input variable (termed the random variables) for the model. A random number generator is used to select a value for each random variable using the input PDF information. Using the selected combination of values for the random variables, a single forecast value is calculated. This process of selecting a set of random variable values and calculating the forecast value is repeated for many iterations (usually 3,000 or more). The frequency distribution for the calculated forecast values represents the probability distribution for the modeled forecast value. A total of 10,000 iterations was used in each Monte Carlo simulation for this site.

In the context of risk assessment, the forecast value of interest is the potential cancer or non-cancer risk (ELCR or HQ, respectively) related to hypothetical exposure scenarios at a particular site. The input random variables are the exposure parameters used to model the potential exposure conditions. In the derivation of a RME point-estimate of the risk (as is usually presented in a risk assessment), the input values for the exposure parameters are selected such that the point-estimate is intended to represent the 95th percentile for the risk (USEPA, 1989b). However, the combination of several highly conservative input values into a single RME calculation of risk (multiplying several worst-case values and dividing by average values) typically overestimates any actual risks likely to be associated with exposure at the site. In addition, this RME point-estimate (i.e., deterministic) approach provides no method of determining the extent to which the actual risk has been overestimated. Monte Carlo simulation is a valuable tool for obtaining a risk probability distribution which can be used to better estimate the 95th percentile for risk and to determine appropriate confidence limits for the risk and indicate the uncertainty associated with the modeled risk values.

5.6.2.1 Input Random Variable Probability Distributions

This section presents the data distributions defined for each of the random variables in the Monte Carlo simulation. The relevant exposure model is the site worker exposure to soil or sludge. This exposure model considers the oral, dermal, and inhalation pathways. Table 5-33 summarizes the input PDFs for the selected random variables. The following paragraphs discuss the source of each input PDF.

Averaging Period and Exposure Period

In the Monte Carlo calculation of cancer risk (ELCR), the averaging period (AP) was not treated as a random variable; the value was held constant at 70 years. The AP for cancer effects was not considered a random variable since the derivation of the CSFs is based upon a 70-year lifetime. Although the AP is constant, the exposure period (EP) will vary and was defined as a random variable for the Monte Carlo Analysis.

Percentile data for the site worker exposure period PDF were obtained from the literature (Finley et al., 1994; American Industrial Health Council [AIHC], 1994):

Minimum = 0 Maximum = 30 years

25th percentile of 1 year

50th percentile of 3.8 years

75th percentile of 11 years

90th percentile of 19 years

95th percentile of 25 years

These percentile data are based on Bureau of Labor Statistics information on the working tenure for U.S. workers. The mean of the values used for the exposure period in the Monte Carlo simulations was reported as approximately 7 years.

Body Weight

The adult body weight (BW) PDF represents adult male data presented in the USEPA *Exposure Factors Handbook* (USEPA, 1995) into a cumulative distribution with the following parameters:

Minimum = 51 kg Maximum = 107 kg (AIHC, 1994)

5^{th} percentile of 58.6 kg

10^{th} percentile of 62.3 kg

15^{th} percentile of 64.9 kg

25^{th} percentile of 68.7 kg

50^{th} percentile of 76.9 kg

75^{th} percentile of 85.6 kg

85^{th} percentile of 91.3 kg

90^{th} percentile of 95.7 kg

95^{th} percentile of 102.7

The BW and exposed skin surface area (SSA) variables were correlated with one another using a correlation coefficient of 0.85 (selected based on professional judgment). This large positive correlation coefficient is intended to account for the fact that individuals with high BW values are expected to also have high SSA values, while low SSA is expected to correspond with low BW.

Exposure Frequency

The exposure frequency (EF) for the site worker was based on the PDF cited for residential exposure (triangular distribution with a minimum of 180 days/year, a most likely value of 345 days/year, and a maximum value of 365 days) (Smith, 1994). This residential PDF was multiplied by a factor of 5/7 (based on 5 workdays per 7-day week) and reducing the maximum value by 5 to account for 5 holidays per year, resulting in a triangular distribution with minimum of 130 days/year, most likely value of 240 days/year, and maximum of 255 days/year.

Exposure Point Concentration

The constituent EPCs were defined based on the analytical data presented in Section 5.1.1. For all but one scenario, no PDFs were defined for the EPCs; rather, the software was set to randomly select one of the actual measured or modeled concentration values with each iteration of the Monte Carlo simulation (a process referred to as bootstrapping). The selection probability for each measured or modeled concentration value was determined by the frequency with which that value appears in the dataset. For the site worker exposure to surficial soil (the scenario with the highest total ELCR), the data for benzo(a)pyrene, benzo(a)anthracene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene were fit to a log-normal distribution using the Crystal Ball[R] software. These constituents were selected because they each had ELCRs exceeding 1×10^{-6}, and it was intended that the log-normal distribution would give a more complete representation of the data.

Exposure Time

Based on professional judgment, the daily exposure time PDF for the site worker was input as a triangular distribution, ranging from 0 to 9 hours/day, with 8 hours/day as the most likely value.

Skin Surface Area

The exposed SSA PDF for the Monte Carlo simulation was derived based upon data presented in the USEPA *Exposure Factors Handbook* (USEPA, 1995; Kissel et al., 1996) which presents the SSA percentile data for men and women and recommends that for outdoor exposures in areas of moderate temperature, the assumption that 5 percent of the total body SSA is exposed during winter months, 10 percent in the spring and fall, and 25 percent in the summer months. This is a conservative assumption since workers are unlikely to wear shorts, which is assumed in the 25 percent value for the summer months. Assuming 3 months per season, this results in an SSA PDF which is 0.125 multiplied by the PDF for total body SSA (Normal, with Mean = 19,700 square centimeters (cm^2), standard deviation = 1,900 cm^2). Thus, the input PDF for SSA was NORMAL, with a mean of 2,460 cm^2 and a standard deviation of 240 cm^2. As stated previously, the BW and SSA variables were correlated with one another using a correlation coefficient of 0.6 (based on professional judgment).

Soil Adherence Rate

The PDF for soil adherence rate (SAR) was derived based on data from Kissel et al. (1996), as presented by USEPA (1995). Kissel measured soil loading on the skin of the hands, arms, face, and feet of people engaged in a variety of activities. For this site, data for 5 groups of groundskeepers (a total of 29 individuals) were used to conservatively represent site worker activity. It was assumed that the hands, forearms, and head would be exposed, and the SAR data reported by Kissel et al. (1996) were area-averaged using the relative areas of the three body parts and the SAR values reported for each. Using this input in a Monte Carlo Analysis resulted in a PDF which was approximately normal with a mean of 0.03 milligrams per square centimeter (mg/cm^2) and a standard deviation of 0.003 mg/ cm^2.

Soil Ingestion Rate

The site worker soil ingestion rate was derived from data for adult soil ingestion. Based on the default soil ingestion rate point estimate value of 100 mg/day for adults vs. the default point estimate value of 50 mg/day for a site worker (USEPA, 1991), the cumulative probability data reported in the *Exposure Factors Sourcebook* (AIHC, 1994) was reduced by a factor of 1/2:

Minimum = 0 Maximum = 108 mg/day

67 percent probability less than or equal to 8.5 mg/day

83 percent probability less than or equal to 74 mg/day

5.6.2.2 Monte Carlo Results

A Monte Carlo simulation of total ELCR was run using the input random variable PDFs described in the previous section and presented in Table 5-33. The forecast probability density curves for total ELCR are shown in Table 5-34. The median (50th percentile), mean, and 95th percentile for the ELCR forecast probability density curves are presented below:

Total ELCR
(Monte Carlo Results)

Exposure Medium	Median	Mean	95^{th} %
SWMU 23 Sludge Waste	3E-08	2E-07	9E-07
SWMU 24 Sludge Waste	4E-08	2E-07	1E-06
SWMU 24 Surficial Soil	8E-08	5E-07	2E-06
SWMU 39 Sludge Waste	1E-08	9E-08	4E-07

The 95^{th} percentile values all lie below or slightly exceed the lower end of the range of acceptable cancer risk (10^{-6} to 10^{-4}); the median and mean values all lie below this level. Typically, the median value is used to represent average exposure conditions while the 95^{th} percentile is used to represent RME conditions. Based on these results, the site does not pose unacceptable cancer risk under the assumed exposure conditions.

5.7 ECOLOGICAL RISK ASSESSMENT

The objective of the ecological risk assessment (ERA) is to determine whether constituents detected at SWMU 23, SWMU 24, and SWMUS 38 and 39 have the potential to adversely affect the ecosystem at these SWMUs or surrounding areas. The standard paradigm for predictive ERA, as presented in the USEPA Framework for Ecological Risk Assessment (USEPA, 1992), the USEPA Region IV Supplemental Guidance to RAGs (USEPA, 1996a), and the Ecological Risk Assessment Guidance for Superfund (USEPA, 1997c), was adapted to the ecological assessment of the site.

The first step of the ERA is problem formation which discusses site characteristics, selection of constituents of ecological concern (COECs), endpoints and measurements for the assessment, and potential receptor populations. The second step is the exposure assessment which evaluates the relationship between ecological receptors and affected media at the site. The third step of the ERA is the effects assessment which discusses available toxicity data for COECs. The fourth step of the ERA is the risk characterization which integrates the results of the exposure assessment and effects assessment to estimate risks to potential ecological receptors

5.7.1 Problem Formation

This section describes the relative ecological attributes of SWMUs 23, 24, 38, and 39, the selection of COECs, and the endpoints for the assessment. Potential sources of contamination are discussed in Section 5.3.2 (Conceptual Site Exposure Model).

5.7.1.1 Environmental Description

An ecological inventory (EI) was conducted at the site June 2 through June 4, 1997, to characterize the biotic resources associated with SWMUs 23, 24, 38, and 39 as part of the ongoing RFI. The objectives of the EI were to: (1) gather qualitative and semi-quantitative information on the ecological communities present at the site; (2) identify pathways by which biological receptors could be exposed to media containing site-related constituents; and (3) document any visible evidence of stress on biological receptors at the site. The findings of the EI are summarized below.

During the investigation, a survey of the terrestrial flora and fauna of the site was conducted. A limited survey of aquatic flora and fauna was conducted. No attempt was made to assemble a complete list of plant and animal life within the site; however, a representative list was compiled utilizing as many different plant and animal types and species as possible via sight and sound surveys. Survey evidence included plant and animal sightings, animal calls, bird songs and calls, and animal droppings and tracks. Terrestrial and aquatic ecosystems and associated plant and animal species were visually observed for any signs of stress placed upon them by the site and/or human activities (i.e., land development), and/or by abnormal natural events such as drought or flooding.

To characterize biotic resources, each area was investigated. Identification of major vegetative communities and the species composition were recorded by written field notes. Photographs were taken to document field observations/conditions. Potential wetland areas were identified based on observed vegetation, soil, and hydrologic characteristics. All communities were characterized for their potential to support biota and observations of biotic communities and/or species which appeared stressed or unhealthy.

Plant species follow nomenclature found in Radford et al. (1968) and Petrides (1988), and animal species follow documentation in Mount (1975), Rhode et al. (1994), Stokes (1996), and Webster et al. (1985). Scientific nomenclature and common names (when applicable) are provided for each plant and animal species listed. Subsequent references to the same organism include the common name only. The presence of wetland habitats on site was determined using Cowardin et al. (1979), Environmental Laboratory (1987), and Wetland Training Institute, Inc. (1991).

During surveys, wildlife identification involved a variety of observation techniques: active searching and capture, visual observations (both with and without the use of binoculars), and identifying characteristic signs of wildlife (sounds, scats, tracks, burrows, etc.). Organisms captured during these searches were identified and released without injury. Equipment used for aquatic sampling included a hand-held dip net and minnow traps.

A variety of plant and animal species occur on the site and in the surrounding areas. SWMUs 23, 38, and 39 contain habitats potentially used by ecological receptors.

SWMU 24 consisted primarily of barren soil and is of an industrial nature such that limited useable habitat is present. Potentially complete exposure pathways for terrestrial animals include exposure to potentially impacted soils and/or sludges. Exposure routes may include direct contact and ingestion; volatilization is considered to be a minor exposure route. Based on qualitative observations, no adverse ecological effects were apparent at the site. The nearest surface-water body to the site is Five Mile Creek. Much of the storm-water runoff from the site drains to a large surface impoundment (polishing pond) before permitted discharge to Five Mile Creek. Therefore, limited potential exists for constituent migration pathways to aquatic receptors in the creek. No evidence was found during the site visit of stressed biota resulting from off-site migration. Specific information concerning the EI is summarized below.

5.7.1.1.1 Physical Resources

Jefferson County is in the Appalachian Highlands major physical division of the United States. Birmingham is in the southeastern part of the county and lies in the Tennessee section of the Valley and Ridge physiographic province. This province is underlain by sedimentary bedrock deformed by folding and faulting. Horizontal compression of the bedrock produced a series of major folds, called anticlines and synclines. These folds were broken by major shear fractures, called thrust faults, causing portions of the folds to be displaced northwestward for several miles. During this period, approximately 200 million years ago, a series of long, narrow parallel valleys and ridges developed. The ridges have bedrock that are more resistant to erosion than material in the valleys. These valleys and ridges are oriented in a northeast-southwest direction (Spivey, 1982).

5.7.1.1.1.1 Soil

The process of soil development depends upon both biotic and abiotic influences. These influences include past geologic activities, nature of parent material, environmental and human influences, plant and animal activity, age of sediments, climate, and topographical position.

SWMUs 24, 38, and 39 are underlain by Urban Land, while SWMU 23 is underlain by the Allen-Urban land complex. Urban Land soils consist of areas covered by commercial, industrial, and high density residential facilities. These areas have been altered to achieve large areas that are nearly level, to avoid flooding or wetness problems, or to increase the load supporting capacity. The original soils were altered by cutting and filling, shaping and grading, excavating, blasting, compacting, or covering with concrete or asphalt. The Allen-Urban land complex consists of strongly sloping, well drained Allen soils and areas of Urban Land on mountain foot slopes and uplands of limestone valleys. The available water capacity of Allen soils is moderate to high. Permeability is moderate, and the shrink-swell potential is low. Surface runoff is moderately fast (Spivey, 1982).

5.7.1.1.1.2 Water Resources

Several unnamed tributaries are responsible for carrying the surface drainage off of the Sloss property. Two drainages, one west of SWMU 38 and one east of SWMU 39, carry surface runoff from these SWMUs into Five Mile Creek, located north of the property. The drainage west of SWMU 38, the Stormwater Runoff Sewer (SWMU 25), was established to carry stormwater runoff from the Sloss Facility and noncontact cooling water into a polishing pond before entering Five Mile Creek. The other drainage, adjacent to SWMU 39, flows into Five Mile Creek. SWMU 23 is primarily a ponded area. A pipe located along the southern dike drains this area. Surface runoff travels southward down the hill and eventually flows into the polishing pond. Surface runoff from SWMU 24 also flows into the polishing pond. A drain along the northern perimeter of the polishing pond diverts water directly into Five Mile Creek.

5.7.1.1.2 Biotic Communities

This section describes the existing vegetation and associated wildlife that occur within the vicinity of SWMUs 23, 24, 38, and 39. Wildlife and other fauna are observed less easily than the flora of an area without special efforts by the investigators. The wildlife associated with the study area of the proposed project are divided into two sections: terrestrial fauna and aquatic life. Some taxa will often occupy both terrestrial and aquatic habitats. Descriptions of fauna likely to occur within the project area, based on the evidence available, are given below.

5.7.1.1.2.1 SWMU 23

SWMU 23, known as the BTF Sludge Disposal Area, is located at the northwest part of the Sloss Facility. The unit received approximately 10 tons of biological sludge a day until 1993 when all disposal in the unit was discontinued. Currently, terrestrial plant communities within SWMU 23 are represented by two major community types: successional and wetland. A dense mat of vegetation covers the majority of the SWMU, which is approximately 2 acres in size. Seasonal ponding of water occurs.

Successional plant communities present along the rim and adjacent upland areas of SWMU 23 include several species of ragweed (*Ambrosia* spp.), goldenrod (*Solidago* sp.), pokeweed (*Phytolacca americana*), aster (*Aster* spp.), milkweed (*Asclepias* spp.), smooth sumac (*Rhus glabra*), dogfennel (*Eupatorium* sp.), mulberry (*Morus* sp.), black cherry (*Prunus serotina*), broomstraw (*Andropogon* sp.), morning-glory (*Ipomoea* sp.), birch (*Betula* sp.), Queen Anne's lace (*Daucus carota*), and blackberry (*Rubus* sp.).

Wetland plant communities consist primarily of emergent vegetation. Dominant vegetation includes soft rush (*Juncus* sp.), cattail (*Typha latifolia*), and duckweed (*Lemna* sp.). Young willow (*Salix* sp.) also was observed around the edges of the pond.

Wildlife species observed utilizing areas of SWMU 23 were primarily birds. Barn swallows (*Hirundo rustica*), purple martins (*Progne subis*), red-winged blackbird (*Agelaius phoeniceus*), killdeer (*Charadrius vociferus*) and mourning dove (*Zenaida macroura*), were observed in the area. Amphibians, such as the gray treefrog (*Hyla versicolor*) and leopard frog (*Rana sphenocephala*), were heard calling. One mammal, an eastern cottontail rabbit (*Sylvilagus floridanus*), was observed near the SWMU. No reptiles were observed. Other animals are expected to utilize this community either for foraging or shelter. Common animals expected to occur include those adapted to disturbed and early successional areas. Species of mice, rats, snakes, lizards, frogs, toads, and small mammals may be observed in the vicinity of the SWMU. Overall, wildlife diversity in the vicinity of the SWMU is expected to be moderate as a result of the surrounding undeveloped land.

A low diversity of aquatic species is expected. Frogs appear to be the dominant faunal type. No minnows or other fish were observed or noted during the field investigation. The water was discolored and a sheen was visible. The water also had an odor.

5.7.1.1.2.2 SWMU 24

SWMU 24 is near the northeast corner of the property, immediately south of the polishing pond. SWMU 24 is a blast furnace emission control sludge waste pile and contains black granular material generated during the production of pig iron from 1958 to 1979. Field observations indicate that much of the sludge material associated with the SWMU has been removed. Sludge material is currently being removed from the area.

The majority of the SWMU is barren land. A large amount of sludge appears to have been removed from the northernmost area. Vegetation is in a very early stage of succession. The northern area of the SWMU exhibits mainly pioneer species such as goldenrod, ragweed, blackberry, and various grasses. The diversity at the present time is relatively low. SWMU 24 is approximately 10 acres in size.

Wildlife diversity in the area is consistent with plant diversity. Very few species were noted during the field investigation. The species observed were red-winged blackbird, killdeer, and bank swallows, and were noted along the northernmost portion of the SWMU, adjacent to the polishing pond. No aquatic habitats are present at SWMU 24.

5.7.1.1.2.3 SWMU 38

SWMU 38 is in the north-central part of the Sloss Facility, west of the quarry and south of SWMUs 23 and 24. It consists of a landfill used by Sloss for construction-type debris. Debris identified at the landfill included concrete rubble, conveyor belts, wood, construction material, empty 55-gallon drums, flue dust, and coal. This SWMU has more diversity of vegetation and wildlife than SWMUs 23 and 24. SWMU 38 is bounded to the west by a stormwater runoff sewer (SWMU 25) and to the east by an above-ground BTF sewer line. SWMU 38, used for disposal of construction debris and soil from excavation activities, is approximately 10 acres in size.

The vegetation present in and around SWMU 38 is classified as disturbed. Areas along the slopes of the SWMU exhibit a canopy and understory of vegetation while areas on the top only have pioneer species. The rim of the SWMU is relatively flat and void of vegetation. Hackberry (*Celtis laevigata*), box elder (*Acer negundo*), red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), water oak (*Quercus nigra*), red cedar (*Juniperus virginiana*), black walnut (*Juglans nigra*), birch (*Betula* sp.), mullein (*Verbascum* sp.), and princess-tree (*Paulowinia tomentosa*) were noted along these slopes. Vines included grape (*Vitis* sp.), Virginia creeper (*Parthenocissus quinquefolia*), Japanese honeysuckle (*Lonicera japonica*), trumpet creeper (*Campsis radicans*), and poison ivy (*Toxicodendron radicans*). Herbaceous vegetation noted on the slopes of the

SWMU consisted of goldenrod, ragweed, milkweed , mimosa (*Albizia julibrissin*), clover (*Trifolium* sp.), aster, Queen Anne's lace, pokeweed, thistle (*Carduus* sp.), and spleenwort (*Asplenium* sp.). In addition to mimosa, birch, boxelder, and Japanese honeysuckle, cocklebur (*Xanthium* sp.), morning glory (*Ipomoea* sp.), vetch (*Vicia* sp.), and blackberry (*Rubus* sp.) were noted along the top portions of SWMU 38.

A small area temporarily inundated by water was noted outside the northern perimeter of SWMU 38. It consists primarily of bottomland hardwoods (maples, oaks, etc.) and is approximately 1 acre in size. This inundated area resulted from an influx of water from the stormwater runoff sewer (SWMU 25). A blockage was noted in the sewer which caused the diversion of water into this area. The water was retained in this area by a small rock outcrop outside of the northeast perimeter.

Bird species observed in the landfill area were northern bobwhite (*Colinus virginianus*), mockingbird (*Mimus polyglottos*), red-winged blackbird, mourning dove, killdeer, and bank swallows. One eastern cottontail rabbit was noted along the northern perimeter. Otherwise, no reptiles or amphibians were seen; however, habitat is available for these and other species that require open, disturbed areas. A low diversity of wildlife is expected to utilize this community due to its location and proximity to surrounding forested communities.

A minnow trap was set just below the rock outcrop in the area inundated by the stormwater runoff sewer. One banded pigmy sunfish (*Elassoma zonatum*) was captured. No other aquatic fauna was observed in this area.

5.7.1.1.2.4 SWMU 39

SWMU 39 is also a blast furnace waste pile. SWMU 39 contains black granular material, similar to SWMU 24, that was generated during the production of pig iron from

1958 to 1979. The waste pile at SWMU 39 is a northeast-southwest trending ridge that is adjacent to SWMU 38. SWMU 39 is approximately 10 acres in size.

Vegetation associated with SWMU 39 is very similar to that of SWMU 38 except that pines, including loblolly pine (*Pinus taeda*) and Virginia pine (*Pinus virginiana*), occupy the northern perimeter rather than hardwoods.

One wetland community is along the eastern boundary of SWMU 39. This community is associated with the drainage canal that flows into Five Mile Creek. Cattails, soft rush, willow, and water oak were the dominant vegetation. The wetland community opens into a small pond-like area immediately north of the SWMU.

Wildlife observed in the vicinity of SWMU 39 consists mostly of birds: mockingbird, gray catbird (*Dumetella carolinensis*), red-winged blackbird, northern cardinal (*Cardinalis cardinalis*), great crested flycatcher (*Myiarchus crinitus*), mourning dove, and bank swallows. Like SWMU 38, SWMU 39 is expected to have a low diversity of wildlife primarily due to its location.

Aquatic fauna were observed in the adjacent drainage canal and small pond area. Eastern mosquito fish (*Gambusia* affinis), crayfish (*Procambarus* sp.), dragonfly nymphs, and several frogs (*Rana* sp.) were observed in these areas. The diversity of aquatic fauna is also expected to be low due to its location and surrounding land uses.

5.7.1.1.3 Biotic Stresses

Indications of potential biotic stress were looked for during the field investigation. Biotic stress may be induced by chemical and/or non-chemical anthropogenic activities. Chemically-induced stress may be identified by a number of characteristics including reduced biotic diversity, changes in community composition, and mortality of organisms. Stained soil, surface-water odors, or other signs of potential impacts may also indicate chemically-induced stress. Non-chemical anthropogenic effects such as urban development and agricultural practices may also result in reduced biotic diversity and/or abundance, changes in community composition, and organisms mortality.

Vegetation at the site was found to be in good condition. No difference in vegetation health was observed between plants on-site and off-site. The vegetation present at the SWMUs appeared healthy.

5.7.1.1.4 Special Status Species

The Alabama Natural Heritage Program and the Alabama Division of Game and Fish were requested to provide the most recent information concerning the occurrence of threatened and/or endangered plant and animal species, any habitats of special concern, and/or environmentally sensitive areas at or in the vicinity of the site. The requests and responses are presented in Appendix E. Responses from these agencies indicated that a Federally endangered fish species, the Watercress Darter (*Etheostoma nuchale*), inhabits Roebuck Springs, which is approximately 3 to 5 miles east of the site. Due to the fact that the Watercress Darter is found only in watercress-choked waters of limestone origin with substrate of angular gravel in riffle areas and silt and mud in areas of watercress, and these types of surface-water bodies do not exist on or near the site, there is no reason to believe that COECs present any potential impact to this animal species. Additionally, COECS identified at the site would not be expected to migrate to Roebuck Springs.

5.7.1.2 Selection of Constituents of Ecological Concern

The selection of potential COECs for the ERA involves a screening process that is used to limit the constituents that require evaluation in the assessment to those constituents of greatest ecological concern. Because the toxicity of some constituents to wildlife differs from that of human receptors, the COECs for the ERA may differ from those evaluated in the human health risk assessment. Data used in the determination of potential COECs are presented in Tables 5-1 through 5-6.

COECs were selected by comparing maximum constituent concentrations detected in soil and sludge samples to background constituent concentrations and Oak Ridge National Laboratory (ORNL) preliminary soil remediation goals (PRGs) for ecological endpoints (ORNL, 1996). Background data for soil were presented in Table 5-9. ORNL Ecological PRGs for soil were selected by comparing toxicological benchmarks for plants, microorganisms, earthworms, and wildlife, and selecting the lowest value as the PRG. Constituent concentrations detected in soil and sludge samples at each SWMU that exceeded two times the site-specific background concentration or the ORNL PRG were retained as COECs. The selection of COECs is presented in Tables 5-35 through 38.

5.7.1.3 Assessment and Measurement Endpoints

This ERA focuses on representative receptors that may be affected directly or indirectly by selected COECs and the likelihood and extent of those effects. Flora and fauna observed at the site were discussed in Section 5.7.1.1. Terrestrial receptors were selected for quantitative exposure assessment to surficial soil and sludge. Potential risks to aquatic receptors were not assessed in this risk assessment since the major bodies of water associated with the site (various drainage ditches and Five Mile Creek) will be sampled and assessed at a later date as part of subsequent field activities and reports.

The endpoint for this assessment was effects on herbivorous populations through soil and sludge exposure sufficient to impair reproduction. COEC concentrations in soil, sludge, and food sources were compared to toxicological benchmark values as a measure of this endpoint. Toxicological benchmark values are presented in Table 5-39.

It is not feasible to evaluate COEC effects on all species using habitats at the site; therefore, target receptor species are selected and evaluated as surrogate species for terrestrial organisms with the greatest potential for exposure. The eastern cottontail rabbit (*Sylvilagus floridanus*) was selected as an indicator species to evaluate the assessment endpoints because it is societal, has a range small enough to be associated with the site, serves as prey for a variety of species, would be expected to be exposed to media at the site, and was observed on-site during the ecological field survey.

5.7.2 <u>Exposure Assessment</u>

The exposure assessment evaluates the relationship between ecological receptors and media at the site. Potential exposure pathways, exposure point concentrations, specific target receptor species, and exposure doses are discussed in this section.

5.7.2.1 Exposure Pathways

The primary means by which ecological receptors may be exposed to constituents at the site is through incidental ingestion of, and dermal contact with, surficial soil and/or sludge. Potential exposure pathways for terrestrial wildlife include ingestion of food (either plant or animal), incidental ingestion of soil while foraging, grooming or burrowing, inhalation of particulates or vapors potentially released at the site, and ingestion of surface water. The total exposure by terrestrial wildlife is represented by the sum of the exposures from each individual source. COECs at the site (primarily SVOCs and inorganics/metals) are not expected to volatilize, and as previously indicated, surface water is not evaluated in this assessment with the exception of mercury. COECs identified at the site would not be expected to bioaccumulate in organisms. Therefore, the exposure pathways evaluated for the cottontail rabbit included direct exposure to COECs via soil and sludge ingestion and indirect exposure to COECs via ingestion of vegetation at the site.

5.7.2.2 Exposure Point Concentrations

Wildlife species are mobile and likely use various portions of the site. They are unlikely to be exposed to maximum detected constituent concentrations. Therefore, estimates of exposure to COECs by wildlife species were calculated using the upper 95 percent confidence limit (UCL) on the arithmetic average constituent concentrations detected in soil and surface-water media at the site.

5.7.2.3 Exposure Dose Calculation

Potential exposure pathways for the cottontail rabbit at the site include ingestion of food (plants), incidental ingestion of surficial soil, ingestion of drinking water, and inhalation of contaminated air or particles. Respiration data were unavailable for the rabbit and as previously mentioned, COECs at the SWMUs are not expected to volatilize; therefore, the inhalation pathway was not evaluated. Surface-water data are unavailable to evaluate the drinking-water pathway. The daily intake of COECs for the rabbit through ingestion of food (plants) and soil was estimated by the following equation:

$$\frac{I=[(Cveg)(Iv)+(Cs)(Is)](H)}{BW} \qquad \text{(USEPA, 1997c)}$$

where:

I	=	total estimated constituent intake (mg/kg/day);
Cveg	=	constituent concentration in vegetation (mg/kg);
Cs	=	constituent concentration in soil or sludge (mg/kg);
Iv	=	ingestion rate of vegetation (kilograms per day [kg/day]);
Is	=	ingestion rate of soil or sludge (kg/day);
H	=	home range/area of concern (unitless); and
BW	=	body weight (kg).

Information required to estimate constituent exposure for the target species was obtained from the available literature. The food consumption rate for the rabbit is reported to be 0.237 kg/day (Dalke and Sime, 1941), and the incidental soil ingestion rate is assumed to be 6.3 percent of the diet or approximately 0.15 kg/day (Sample and Suter, 1994). The average cottontail body weight is 1.2 kg (Sample and Suter, 1994), and the home range ranges from 7.65 acres to 19.26 acres (Sample and Suter, 1994). The area of the SWMUs ranges from approximately 2 acres (SWMU 23) to 10 acres (SWMUs 38 and 39). An area use factor of 1, which equals the home range divided by the area of each SWMU, was used as a conservative measure.

Data on the constituent concentrations in vegetation (Cveg) were not available. Therefore, these values were estimated using soil to plant uptake factors obtained from the literature. Soil-to-plant uptake factors (PU) for organic constituents were derived using methods presented by Travis and Arms (1988) in which uptake factors for organic constituents in vegetation is inversely proportional to the square root of the octonal-water partitioning coefficient (K_{ow}). PUs for inorganic constituents were obtained from Baes et al. (1984). The PUs are presented in Table 5-40. PUs estimate constituent concentrations on a dry-weight basis. Therefore, a dry-to-wet conversion must be used. Based on the assumption that fresh foliage is 85 percent water (USEPA, 1993), the COEC in fresh vegetation is estimated by the following equation:

$$\text{Foliage}_{\text{fresh}} = \text{Foliage}_{\text{dry}} \times (1\text{-W})$$

where:

$\text{Foliage}_{\text{fresh}}$	=	constituent concentration in fresh foliage;
$\text{Foliage}_{\text{dry}}$	=	constituent concentration in dry foliage; and
W	=	proportion of water in foliage (0.85).

Therefore, Cveg is calculated by multiplying the COEC concentration in soil by the PU and by 1-W.

5.7.3 Effects Assessment

Information on the measurement endpoints and potential toxicity of COECs to ecological receptors is presented and discussed in this section. Measurement endpoints are used to link conditions at the base with the assessment endpoints (Section 5.7.1.3, Assessment and Measurement Endpoints). The measurement endpoint included:

- A hazard quotient in excess of 1 for COECs for the selected terrestrial herbivore indicator species (cottontail rabbit), white-footed mouse, and white-tailed deer;

Toxicity information derived from the literature was used to develop benchmark values for the selected indicator species. By comparing constituent concentrations measured at the site to these benchmarks, the likelihood that constituents pose a risk to ecological receptors was determined. Calculated exposure doses and constituent concentrations were compared to benchmarks to derive HQs used in the assessment. To determine potential hazards to the indicator species, benchmarks related to reproductive endpoints were used whenever possible. Reproductive endpoints generally are considered protective at the population level, against sublethal adverse effects associated with chronic exposure to a particular constituent. However, based on a comprehensive review of the scientific literature, measurement endpoints related to reproductive effects were not available for some COECs.

Toxicity benchmarks for evaluation of effects to the indicator species were selected from the following sources, listed in order of preference:

(1) chronic NOAELs presented in Sample et al. (1996);

(2) chronic NOAELs presented in the primary literature (various authors); and

(3) toxicological information presented in the primary literature (various authors).

The chronic NOAELs presented are based on experimental studies on laboratory animals. When necessary, uncertainty factors of 10 were used when extrapolating from acute or subchronic studies to chronic effects and when extrapolating from LOAELs to NOAELs (Sample et al., 1996).

The chronic NOAELs for the test species were adjusted further using a scaling factor to account for differences in body weights between the test species and the indicator species. Larger animals have lower metabolic rates and therefore have lower rates of detoxification than smaller animals (Sample et al., 1996). The following equation from Sample et al. (1996) was used to account for body weight differences for each COEC:

$$\text{chronic NOAEL}_i = \text{chronic NOAEL}_t \times (BW_t/BW_i)^{1/4}$$

where:

chronic $NOAEL_i$	=	chronic NOAEL for indicator species;
chronic $NOAEL_t$	=	chronic NOAEL for test species;
BW_i	=	body weight of indicator species; and
BW_t	=	body weight of test species.

The body weights of the test species and the indicator species were taken from the available literature. Toxicological benchmarks for the rabbit are presented in Table 5-39.

5.7.4 Risk Characterization

Risk characterization integrates the results of the exposure assessment and effects assessment to estimate risk to potential ecological receptors. Information from the biological field survey was used in conjunction with site-specific soil and sludge data to qualitatively and quantitatively evaluate the potential risks and to provide a weight-of-evidence approach to best estimate risks at the site. The principal lines of evidence concerning effects used in this assessment were biological data collected during the field survey, which address the actual condition of the receiving environment, and calculation of the effects of exposure on endpoint species using the quotient method.

Potential risks to ecological receptors were assessed by comparing media-specific COEC concentrations or estimated daily doses with toxicological benchmarks. This comparison, called the HQ method, compares estimated expected environmental concentrations (EEC) for a specific constituent or daily doses to benchmark values to determine whether the EEC or receptor dose is less than or equal to an acceptable or "safe" dose. The HQ is defined as the ratio of the EEC or the estimated daily dose of a constituent through a particular exposure route to the benchmark for the same constituent through that ingestion route. This process is similar to the calculation of the HQ for human health. The comparison was made for each COEC and is expressed as:

$$HQ = \text{Dose (mg/kg-day)/benchmark (mg/kg-day)}$$

where:

HQ	=	hazard quotient;
Dose	=	estimated constituent dose for a given receptor; and
benchmark	=	toxicological benchmark value.

Using this method, the degree to which a particular constituent concentration exceeds a toxicological benchmark can be evaluated. Therefore, an HQ greater than 1 indicates that a given exposure dose exceeds the toxicological benchmark for a particular species. The greater the HQ, the greater the exceedence. An HQ less than 1 indicates that, for a particular constituent-species interaction, ecological risks are unlikely to occur.

Exposures to the same constituent that may occur through multiple exposure pathways was considered using the quotient method for soils. An HQ for a specific chemical (HQchem) represents the sum of the individual HQs for a constituent through more than one pathway. For example, the cumulative HQ for an individual constituent was determined for the white-footed mouse by summing the HQs for plant ingestion and soil ingestion, or:

$$HQ_{chem} = HQ_{plant} + HQ_{soil}$$

where:

HQ_{chem}	=	hazard quotient for an individual constituent;
HQ_{plant}	=	hazard quotient for the constituent through plant ingestion; and
HQ_{soil}	=	hazard quotient for the constituent through soil ingestion or sludge.

The quotient method can also be used to estimate impacts to receptors potentially occurring from exposure to multiple constituents through all exposure pathways at the site. A cumulative HI (HI_{cum}), representing the sum of individual HQ_{chem} or individual HQs for each COEC, was calculated for the indicator species at the site. This calculation is based on the assumption that the potential toxicity of multiple constituents is additive. A discussion of potential risks posed to terrestrial wildlife by constituent concentrations detected at the site is provided in the following paragraphs.

Potential risks to herbivorous terrestrial wildlife through exposure to soil and sludge were assessed by comparing estimated daily doses of COECs (based on the lesser of the 95 percent UCL and the maximum detected concentration) with toxicological benchmark values using the white-footed mouse and the white-tailed deer as endpoint species. The rabbit was assumed to be exposed to COECs through the ingestion of COECs in vegetation and the incidental ingestion of COECs in soil and sludge. HQs for the rabbit based on exposure to soil, vegetation, and sludge for each SWMU with useable habitat (e.g., SWMU 23 and SWMUs 38 and 39) are presented in Tables 5- 41 through 5-44 and are summarized below.

The HI for herbivorous terrestrial wildlife exposure to soil and vegetation at SWMU 23 was 6 (Table 5-41). With the exception of arsenic, no COEC concentration detected in soil produced an HQ greater than 1. The HI for herbivore exposure to sludge and vegetation at SWMU 23 was 950 (Table 5-42). Constituents producing HQs greater than 1 included benzo(a)pyrene, arsenic, barium, mercury, and selenium.

The HI for herbivorous terrestrial wildlife exposure to soil and vegetation at SWMUs 38 and 39 was 3 (Table 5-43). Antimony and barium were the only constituents that produced HQs greater than 1. The HI for herbivore exposure to sludge and vegetation at SWMUs 38 and 39 was 27 (Table 5-44). Constituents producing HQs greater than 1 included antimony, barium, cadmium, lead, and zinc.

Given the likelihood that the rabbit consumes food not found at the SWMUs and, therefore, ingests less soil and vegetation from the SWMUs than estimated, the true dose is likely to be much lower than that calculated. Additionally, the conservative nature of the literature-derived toxicity values used to evaluate ecological risks likely overestimates potential risks to receptors. For example, when the background arsenic concentration (11 mg/kg) is used in the exposure equation, an HQ (of 3) in excess of the benchmark value of 1 still results.

Based on the conservative assumptions and toxicity data used in this assessment, the minimal exceedence of the benchmark HI of 1 for exposure to soil, and the diverse and healthy assemblage of vegetation and wildlife observed during the field survey, unacceptable risks would not be expected for wildlife exposure to soil at SWMU 23 and SWMUs 38 and 39. Although the conservative nature of the assessment likely overestimates risks associated with wildlife exposure to sludge at SWMU 23 and 39, the exceedences of the benchmark HI of 1 indicate that there is the potential for unacceptable risks associated with wildlife exposure at these SWMUs.

5.7.5 <u>Ecological Risk Assessment Uncertainties</u>

Major sources of uncertainty in the ecological assessment are the selection of the indicator species, the use of the site by this species, and the dose estimation. Differences in the feeding habits, habitat, behavior, and activity patterns of animals can result in varying exposure to COECs. The rabbit was assumed to be an appropriate indicator species, but may not represent the most sensitive species. The selection of this species was based on the biological survey conducted at the site. Estimation of the COEC dose involves several uncertainties including the COEC concentration estimated to be taken up from media, the assumed diet of rabbits potentially using the site and their daily food and soil ingestion rates, and utilization of the site. The exposure assumptions used are conservative and would overestimate the actual risk to this species.

5.8 CONCLUSIONS

The human health risk assessment evaluated potential human health effects based on exposure to constituents in soil and sludge at SWMU 23, SWMU 24, and SWMUs 38 and 39. The potential exposure scenarios evaluated were contact to surficial soil and sludge by a Sloss site worker and contact to subsurface soil by a hypothetical future construction worker. Site worker exposure was calculated for exposure to sludge for SWMUs 23, 24, and 39, and was calculated for exposure to surficial soil for SWMU 24. Construction worker exposure was calculated for exposure to subsurface soil in SWMU 23 and SWMUs 38 and 39. Surficial soil and sludge data were used to evaluate current exposure conditions for site workers, and subsurface soil data were used to evaluate future conditions for construction workers. The results of the deterministic (point-estimate) risk estimates are summarized below.

- The ELCR and HI for site worker exposure to sludge in SWMU 23 were 1×10^{-5} and 0.01, respectively.. The major contributor to the ELCR is benzo(a)pyrene. The ELCR and HI for construction worker exposure to subsurface soil in SWMU 23 were 8 x 10^{-7} and 0.1, respectively. The ELCR for site worker exposure is within the target range of 1 x 10^{-6} to 1 x 10^{-4}, and the ELCR for construction worker exposure is below the target range. The HIs for both site worker and construction worker exposure are below the target of 1.

- The ELCR and HI for site worker exposure to surficial soil in SWMU 24 were 4 x 10^{-5} and 0.2, respectively. The major contributor to the ELCR is benzo(a)pyrene. The ELCR and HI for site worker exposure to sludge in SWMU 24 were 2 x 10^{-6} and 0.6, respectively. The major contributor to the ELCR is beryllium. The ELCRs are within the target range of 1 x 10^{-6} to 1 x 10^{-4}, and the HIs are below the target of 1.

- The ELCR and HI for site worker exposure to sludge in SWMU 39 were 2 x 10^{-6} and 0.5, respectively. The only contributor to the ELCR is beryllium. The ELCR and HI for construction worker exposure to subsurface soil in SWMUs 38 and 39 were 8 x 10^{-8} and 0.0003, respectively. The ELCR for site worker exposure is within the target range of 1 x 10^{-6} to 1 x 10^{-4}, and the ELCR for a construction worker is below the target range. The HIs for both site worker and construction worker exposures are below the target of 1.

RGOs were calculated for the exposure scenarios where the ELCR exceeded 1 x 10^{-6}. RGOs for non-carcinogenic risks were unnecessary because all of the HQs and HIs were below 1. Following USEPA (1996a) guidelines, RGOs were presented at ELCR target risk levels corresponding to 10^{-4}, 10^{-5}, and 10^{-6}.

None of the constituent EPC concentrations exceeded the RGO at a 1 x 10^{-4} risk level. Only the benzo(a)pyrene EPC concentrations exceeded a 1 x 10^{-5} risk level. The benzo(a)pyrene EPC in SWMU 24 surficial soil is 7.3 mg/kg, while the RGO is 2.4

mg/kg. A RGO for lead of 1,400 mg/kg was calculated. The lead EPC is above the calculated RGO for sludge in SWMU 24.

Monte Carlo Analysis (probabilistic risk estimate) was conducted for the exposure scenarios where the total excess lifetime cancer risks from the deterministic (i.e., point estimate) calculations exceeded the lower end (1×10^{-6}) of the range of acceptable risk values (10^{-6} to 10^{-4}). Only the cancer risks were included in the Monte Carlo Analysis since the deterministic non-cancer risks were all acceptable (i.e., HI less than 1).

The results of the Monte Carlo Analysis indicated that the 95th percentile values all lie below or slightly exceed the lower end of the range of acceptable cancer risk (10^{-6} to 10^{-4}); the median and mean values all lie below this level. Only site worker exposure to sludge in SWMU 24 (1×10^{-6}) and surficial soil in SWMU 24 (2×10^{-6}) equaled or exceeded the lower end of the acceptable range using the 95th percentile values. Typically, the median value is used to represent average exposure conditions while the 95th percentile is used to represent RME conditions.

The ecological risk assessment evaluated potential ecosystem effects based on potential ecological receptor exposure to constituents in soil and sludge at SWMU 23 and SWMUs 38 and 39. SWMU 24 was found to contain limited habitat to support ecological receptors and, therefore, was not evaluated as part of the ecological assessment. The cottontail rabbit, a herbivorous terrestrial species, was used as an indicator species to evaluate potential ecosystem effects. Exposure pathways evaluated for the indicator species included direct exposure to constituents via soil and sludge ingestion and indirect exposure to constituents via ingestion of vegetation at the SWMUs. The results of the ecological risk assessment are summarized below:

- An Ecological Inventory was conducted to collect data on:
  - biotic communities present on the site and surrounding areas;

- the presence of species of special concern;
- evidence of biological and/or chemical stress; and
- evidence of the potential for algal blooms.

- Based on the ecological assessment, constituent concentrations detected in the soil at the SWMUs are unlikely to present a risk to ecological receptors. There is the potential for unacceptable risks for herbivorous terrestrial species exposed to sludge at the SWMUs.

6.0 RECOMMENDATIONS

The following recommendations for additional investigations are based upon the data presented in Section 4.0 and the risk assessment presented in Section 5.0 of this report. Recommendations were developed and are discussed on a SWMU basis.

6.1 BIOLOGICAL SLUDGE DISPOSAL AREA (SWMU 23)

Due to the low levels of detected constituents and the findings of the risk assessment, no further action is recommended for SWMU 23.

6.2 BLAST FURNACE EMISSIONS CONTROL SLUDGE WASTE PILE (SWMU 24)

Due to the low levels of detection constituents, the findings of the risk assessment, and the on-going mining/removal activities, no further action is recommended for SWMU 24.

6.3 LANDFILL AND BLAST FURNACE EMISSION CONTROL SLUDGE WASTE PILE LANDFILL (SWMUS 38 AND 39)

Due to the low levels of detected constituents, the findings of the risk assessment, and the proposed mining/removal activities for SWMU 39, no further action is recommended for either SWMU 38 or 39.

7.0 REFERENCES

Agency for Toxic Substances and Disease Registry (ATSDR), 1997. Toxicological Profiles. U.S. Public Health Service. CRC Press, Inc.

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. Toxicological Profile for Beryllium. Draft for Public Comment. U.S. Department of Health and Human Services.

Agency for Toxic Substances and Disease Registry (ATSDR), 1989. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. Draft for Public Comment. U.S. Public Health Service.

American Conference of Governmental Industrial Hygienists (ACGIH), 1980. Documentation of the Threshold Limit Values. 4th Edition. Cincinnati, OH.

American Industrial Health Council (AIHC), 1994. Exposure Factors Sourcebook. Washington, DC.

Baes, C.F., III, R.D. Sharp, A.L. Sjoreen, and R.W. Shor, 1984. A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture. Prepared by the U.S. Department of Energy. ORNL-5786. September.

Bouwer, H. and R.C. Rice, 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Wells with Completely or Partially Penetrating Wells. Water Resources Research, Vol. 12, No. 3, pp. 423-428.

Brockman, G.F., 1978. Geologic Map of Part of Jefferson County, Alabama. Unpublished Map.

Cowardin, L.M., Carter, V., Goblet, F.C., and E.T. Laroe. 1979. Classification of Wetland and Deepwater Habitats of the United States. Fish and Wildlife Service, U.S. Department of Interior.

Dalke, P.D. and P.R. Sime, 1941. Food Habits of the Eastern and New England Cottontails. J. Wildl. Manage., 5(2): 216-228.

Environmental Laboratory, 1987. Corps of Engineers Wetland Delineation Manual. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS. Tech. Report Y-87-1.

Finley, Brent L., D. Protor, P.K. Scott, P. Price, N. Harrington, and d. Paustenbach, 1994. Recommended Distributions for Exposure Factors Frequently Used in Health Risk Assessment. *Risk Analysis*, 14:533-545.

Geological Survey of Alabama, 1981. Geology and Natural-Resource Factors Related to Planning and Government in the Jefferson County-Birmingham Area. Geological Survey of Alabama Atlas 17, February 1981, 73 p.

Geraghty & Miller, Inc., 1996. RCRA Facility Investigation, Coke Manufacturing Plant, Sloss Industries Corporation, November 1996.

Geraghty & Miller, Inc., 1996. RCRA Facility Investigation, Facility-Wide Report, Sloss Industries Corporation. February 1996.

Geraghty & Miller, Inc., 1994. RCRA Facility Investigation Work Plan, Sloss Industries Corporation (Draft Final). November 1994.

Goyer, R.A., 1991. Toxic Effects of Metals. *In: Casarett and Doull's Toxicology the Basic Science of Poisons, Fourth Edition.* Amdur, M.O., J. Doull, and C.D. Klaassen (Editors). Pergamon Press, NY. pp. 623-680.

Hammond, P.B., and R.P. Beliles, 1980. In: *Casarett and Doull's Toxicology. The Basic Science of Poisons,* Third Ed. Klaasen, C.D., M.O. Amdur, and J. Doull (Eds.), Macmillan Publishing Company, New York, NY.

Hunter, J.A. and Moser, P.H., 1990. Ground-Water Availability in Jefferson County, Alabama. Geological Survey of Alabama, Special Map 224, 67 p.

Integrated Risk Information System (IRIS), 1997. U.S. Environmental Protection Agency, Office of Health and Environmental Assessment, Cincinnati, OH.

Justice, W.S., and C.R. Bell, 1968. Wild Flowers of North Carolina. The University of North Carolina Press, Chapel Hill, NC. 215 pp.

Kidd, J.T. and Shannon, S.W., 1977. Preliminary Areal Geology of the Valley and Ridge Province, Jefferson County, Alabama. Geological Survey of Alabama Atlas Series 10, December 1977, 41 p.

Kidd, J.T. and Richter, K.E., 1979. Areal Geology of Jefferson County, Alabama. Geological Survey of Alabama Atlas 15, May 1979, 89 p.

Kissel, J.C., K.Y. Richter, and R.A. Fenske, 1996. Field Measurement of Dermal Soil Loading Attributable to Various Activities: Implications for Exposure Assessment. *Risk Analysis*, 16:1, pp. 115-125.

Kricher, J.C., and G. Morrison, 1988. A Field Guide to Ecology of Eastern Forests North America. Houghton Mifflin Company, Boston, MA.

Leonard, A., G.B. Gerber, P. Jacquet, and R.R. Lauwerys, 1984. Mutagenicity, Carcinogenicity and Teratogenicity of Industrially Used Metals. In: Mutagenicity, Carcinogenicity and Teratogenicity of Industrial Pollutants. Kirsch-Volders, M. (ed), Plenum Press, New York and London, pp. 59-126.

Leonard, A. Gerber, G.B., Jacquet, P., and Lauwreys, R.R., 1974. Mutagenicity, Carcinogenicity and Teratogenicity of Industrially Used Metals. In: Mutagenicity, Carcinogenicity and Teratogenicity of Industrial Pollutants. Kirsh-Volders, M. (ed), Plenum Press, New York and London, pp. 59-126.

Little, E.L., 1980. The Audubon Society Field Guide to North American Trees. Alfred A. Knopf, New York, NY.

Lyman, W.J., W.F. Reehl, and D.H. Rosenblatt, 1990. Handbook of Chemical Property Estimation Methods. American Chemical Society, Washington, D.C.

Moffett, T.B. and Moser, P.H., 1978. Ground-water Resources of the Birmingham and Cahaba Valleys of Jefferson County, Alabama. Geological Survey of Alabama Circular 103, 78p.

Montgomery J.H., and L.M. Welkom, 1990. Groundwater Chemicals Desk Reference. Lewis Publishers, In., Chelsea, MI.

Mount, R.H., 1975. The Reptiles and Amphibians of Alabama. Auburn University, Agricultural Experiment Station, Auburn, AL. 347 pp.

National Institute for Occupational Safety and Health (NIOSH), 1978. Criteria for a Recommended Standard – Occupational Exposure to Antimony. DHEW, Publication No. (NIOSH) 78-216. September.

Niering, W.A., and N.C. Olmstead. 1979. The Audubon Society Field Guide to North American Wildflowers Eastern Region. Alfred A. Knopf, New York, NY.

Oak Ridge National Laboratory (ORNL), 1996. Preliminary Remediation Goals for Ecological Endpoints. Prepared by Environmental Restoration Risk Assessment Program, Lockheed Martin Energy Systems, Inc., Oak Ridge, TN. July.

Petrides, G.A., 1988. A Field Guide to Eastern Trees Eastern United States and Canada. Houghton Mifflin Company, Boston, MA.

Potter, E.F., J.F. Parnell, and R.P. Teulings, 1980. Birds of the Carolinas. The University of North Carolina Press, Chapel Hill, NC.

Radford, A.E., H.E. Ahles, and C.R. Bell, 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill, NC. 1183 pp.

Rhode, F.C., R.G. Arndt, D.G. Lindquist, and J.F. Parnell, 1994. Freshwater Fishes of the Carolinas, Virginia, Maryland, and Delaware. The University of North Carolina Press, Chapel Hill, NC.

Rungby, J. and G. Danscher, 1984. Hypoactivity in Silver Exposed Mice. Acta Pharmacol. Et Toxico. 55:398-401.

Sample, B.E., D.M. Opresko, and G.W. Suter, 1996. Toxicological Benchmarks for Wildlife, 1996 Revision. Risk Assessment Program, Health Science Research Division, Oak Ridge, TN, June. ES/ER/TM-86/R3.

Sample, B.E., and G.W. Suter, II, 1994. Estimating Exposure of Terrestrial Wildlife to Contaminants. Prepared by Environmental Sciences Division, Oak Ridge, TN. September.

Smith, R.L., 1994. Use of Monte Carlo Simulation for Human Exposure Assessment at a Superfund Site. *Risk Analysis*, 14:433-440.

Spivey, L.D., 1982. Soil Survey of Jefferson County, Alabama. United States Department of Agriculture, Soil Conservation Service, 140 p. + accompanying maps..

Stokes, Donald and Lillian. 1996. Stokes Field Guide to Birds. Little, Brown and Company, New York, NY. 471 pp.

Szabo, M.W., Beg, M.A., Rheams, L.J., and Clarke, O.M., Jr., 1979. Engineering Geology of Jefferson County, Alabama. Geological Survey of Alabama Atlas 14, 1979, 77 p.

Thomas, W.A. and D.N. Bearce, 1986. Birmingham Anticlinorium in the Appalachian Fold-Thrust Belt, Basement Fault System, Synsedimentary Structure, and Thrust Ramp. Geological Society of America Centennial Field Guide, Southeastern Section, Vol. 6, p. 191-200.

Travis, C.C., and A.D. Arms, 1988. Bioconcentration of Organics in Beef, Milk, and Vegetation. Environ. Sci. Technol., 22:271-274.

U.S. Department of Agriculture Soil Conservation Service, Alabama Agricultural Experiment Station, Alabama Department of Agriculture and Industries, Alabama Surface Mining Reclamation Commission, U.S. Department of Interior and, Bureau of Land Management, compilers, 1981. General Soil Map of Jefferson County, Alabama, Scale 1:190,080, 1 sheet.

U.S. Environmental Protection Agency (USEPA), 1997a. Region III Risk-Based Concentration Table. Office of RCRA, Technical and Program Support Branch. Philadelphia, PA, October 22, 1997.

U.S. Environmental Protection Agency (USEPA), 1997b. Health Effects Assessment Summary. Tables (HEAST) FY-1997 Annual. Office of Emergency and Remedial Response; Washington, DC.

U.S. Environmental Protection Agency (USEPA), 1997c. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Revised Draft. Interim Final. Office of Solid Waste and Emergency Response, Washington, DC. EPA 540-R97-006.

U.S. Environmental Protection Agency (USEPA) Region IV, 1996a. Supplemental Guidances to RAGS: Region 4 Bulletins. Waste Management Division, Atlanta, GA.

U.S. Environmental Protection Agency (USEPA), 1996b. Draft. Methodology for Assessing Risks Associated with Adult Exposures to Lead in Soil. GRC/GLD/F0162-203. August 12.

U.S. Environmental Protection Agency (USEPA), 1996c. Soil Screening Guidance: Technical Background Document. Office of Solid Waste and Emergency Response. Washington, DC. May.

U.S. Environmental Protection Agency (USEPA), 1995. Exposure Factors Handbook. Office of Research and Development. EPA/600/P-95/002A. June.

U.S. Environmental Protection Agency (USEPA), 1993. Wildlife Exposure Factor Handbook: Volumes I and II. Office of Research and Development, Washington, DC. EPA/600/R-93/187a and b.

U.S. Environmental Protection Agency (USEPA), 1992. Framework for Ecological Risk Assessment. Risk Assessment Forum. Washington, DC. EPA/630/R-92/001.

U.S. Environmental Protection Agency (USEPA), 1991. (Standard Exposure Factors).

U.S. Environmental Protection Agency (USEPA), 1990. Site Analysis of Sloss Industries Corporation, Birmingham, Alabama, Volume 1. Environmental Protection Agency Region 4, April 1990.

U.S. Environmental Protection Agency (USEPA), 1989a. RCRA Facility Assessment and Administrative Order (Docket #89-39-R).

U.S. Environmental Protection Agency (USEPA), 1989b. Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Volume 1, Part A. Interim Final. Office of Emergency and Remedial Response, Washington, DC. EPA/540/1-89/002. December.

U.S. Environmental Protection Agency (USEPA). 1985. Updated Mutagenicity and Carcinogenicity Assessment of Cadmium. Addendum to the Health Assessment document for Cadmium (May 1981; EPA/600/8-81/023). Office of Health and Environmental Assessment, Washington, DC. EPA/600/8-83-025F. June.

U.S. Environmental Protection Agency (USEPA), 1980. Ambient Water Quality for Antimony. Office of Water Regulations and Standards, Criteria and Standards Division, Washington, DC. EPA 440/5-80-020. October.

U.S. Geological Survey, 1977. Drainage Areas for Jefferson County, Alabama. Geological Survey of Alabama Atlas Series 11, 1977, 55 p.

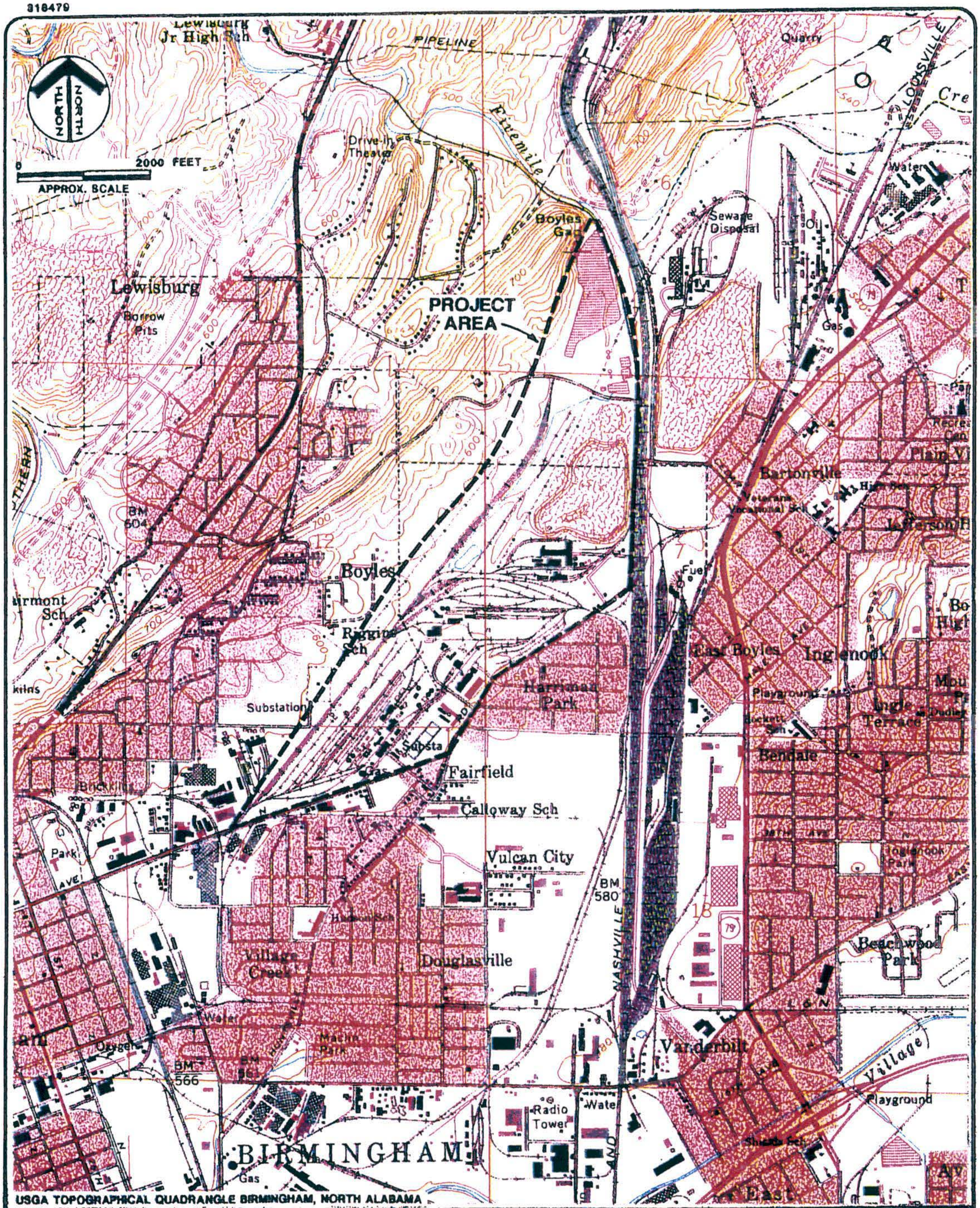
Webster, W.D., J.F. Parnell, and W.C. Biggs, Jr., 1985. Mammals of the Carolinas, Virginia, and Maryland. University of North Carolina Press, Chapel Hill, NC. 255 pp.

Wetland Training Institute, Inc., 1991. Field Guide for Wetland Delineation: 1987 Corps of Engineers Manual. WTI 91-2. 133 pp.

World Health Organization (WHO), 1976. Environmental Health Criteria, Mercury. Geneva.

Yadiv, D.V., P.K. Mittal, H.C. Agarwal, and M.K. Krishna Pillia, 1981. Fish, Wildlife, and Estuaries: Organochlorine Insecticide Residues in Soil and Earthworms in the New Delhi Area, India. Pest. Monit. J., 15:8-85.

318479



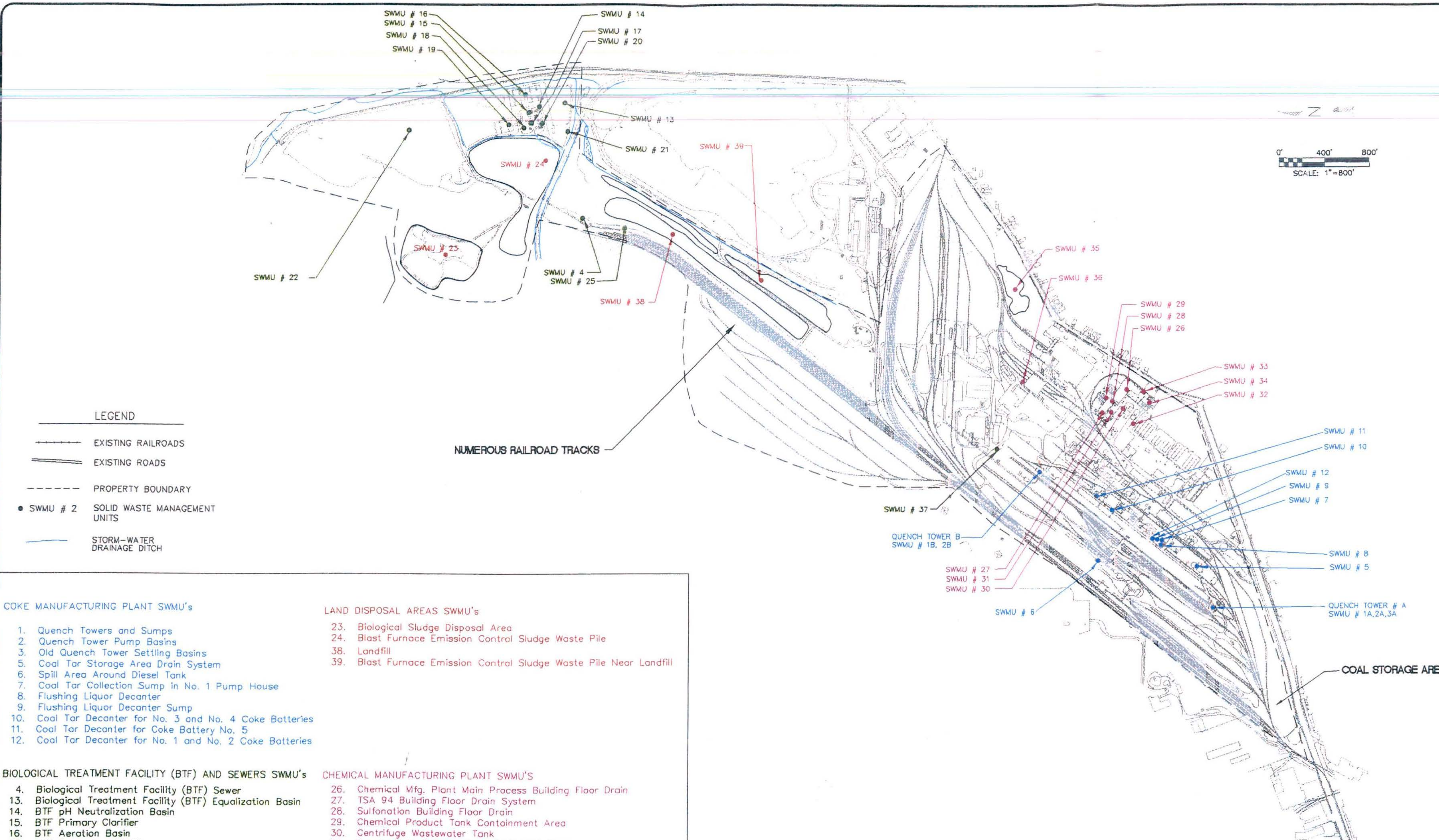
USGA TOPOGRAPHICAL QUADRANGLE BIRMINGHAM, NORTH ALABAMA

GERAGHTY & MILLER, INC.
Environmental Services

PROJECT LOCATION MAP

SLOSS INDUSTRIES, CORPORATION
BIRMINGHAM, ALABAMA

FIGURE
1-1



DWG DATE: 12/5/97 | PRJCT NO.: TF0320.013 | FILE NO.: SLOSS | DRAWING: SLO95.DWG | CHECKED: KT | APPROVED: PF | DRAFTER: BJH

COKE MANUFACTURING PLANT SWMU's

1. Quench Towers and Sumps
2. Quench Tower Pump Basins
3. Old Quench Tower Settling Basins
5. Coal Tar Storage Area Drain System
6. Spill Area Around Diesel Tank
7. Coal Tar Collection Sump in No. 1 Pump House
8. Flushing Liquor Decanter
9. Flushing Liquor Decanter Sump
10. Coal Tar Decanter for No. 3 and No. 4 Coke Batteries
11. Coal Tar Decanter for Coke Battery No. 5
12. Coal Tar Decanter for No. 1 and No. 2 Coke Batteries

LAND DISPOSAL AREAS SWMU's

23. Biological Sludge Disposal Area
24. Blast Furnace Emission Control Sludge Waste Pile
38. Landfill
39. Blast Furnace Emission Control Sludge Waste Pile Near Landfill

BIOLOGICAL TREATMENT FACILITY (BTF) AND SEWERS SWMU's

4. Biological Treatment Facility (BTF) Sewer
13. Biological Treatment Facility (BTF) Equalization Basin
14. BTF pH Neutralization Basin
15. BTF Primary Clarifier
16. BTF Aeration Basin
17. BTF Secondary Clarifier
18. BTF Thickener
19. BTF Digester
20. Dewatering Machine
21. BTF Emergency Basin
22. Polishing Pond
25. Storm Water Runoff Sewer
37. BTF Sewer Tar Trap

CHEMICAL MANUFACTURING PLANT SWMU'S

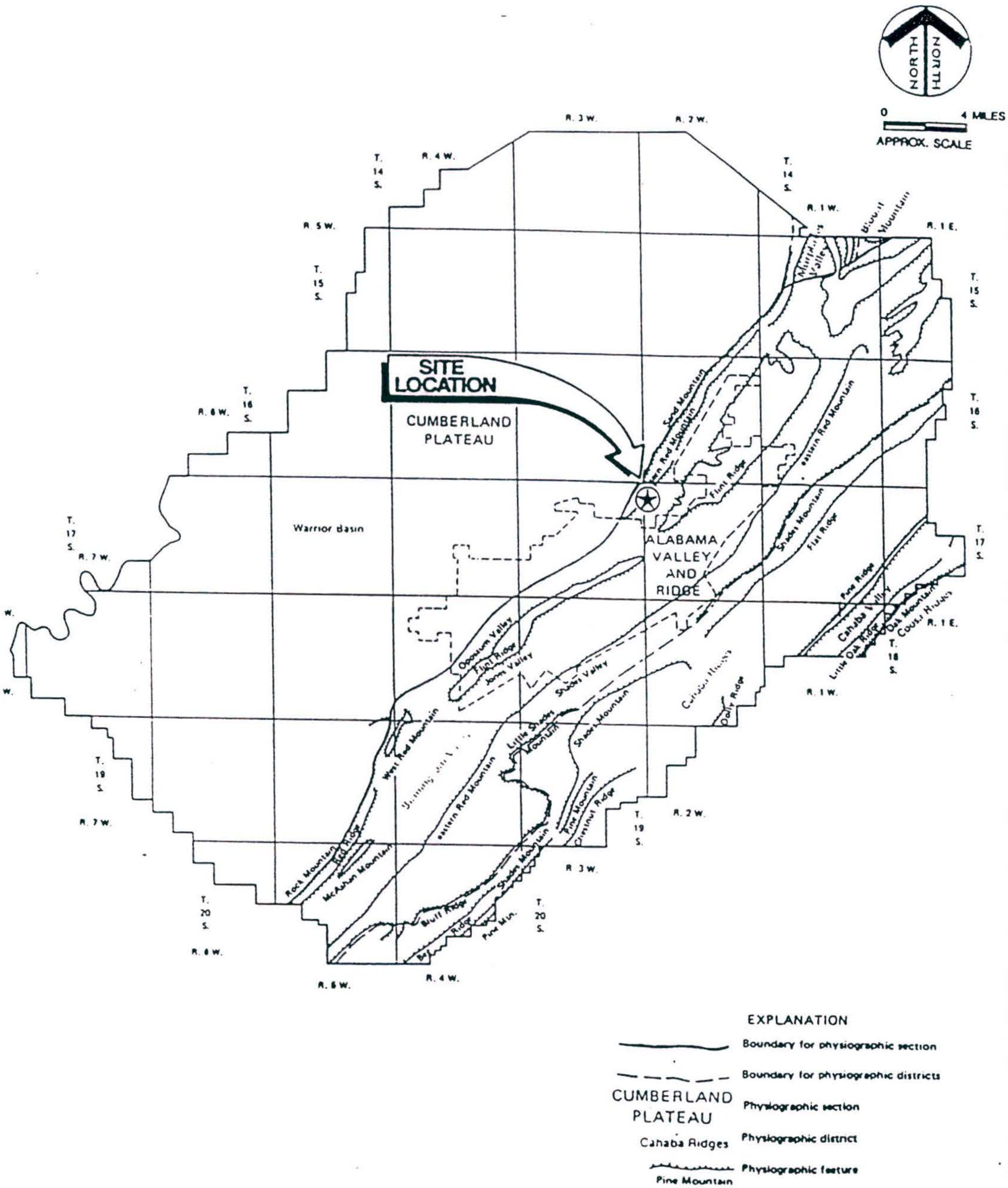
26. Chemical Mfg. Plant Main Process Building Floor Drain
27. TSA 94 Building Floor Drain System
28. Sulfonation Building Floor Drain
29. Chemical Product Tank Containment Area
30. Centrifuge Wastewater Tank
31. Monohydrate Building Floor Drain and Sump
32. Benzenesulfonyl Chloride Drum Storage Area
33. Benzenesulfonyl Chloride Plant Drum Storage Area
34. Benzenesulfonyl Chloride Wastewater Neutralization System
35. Old Waste Pile at Mineral Wool Plant
36. Maintenance Shop Used Oil Tank

GERAGHTY & MILLER, INC.
Environmental Services

FACILITY PLAN

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE
1-2

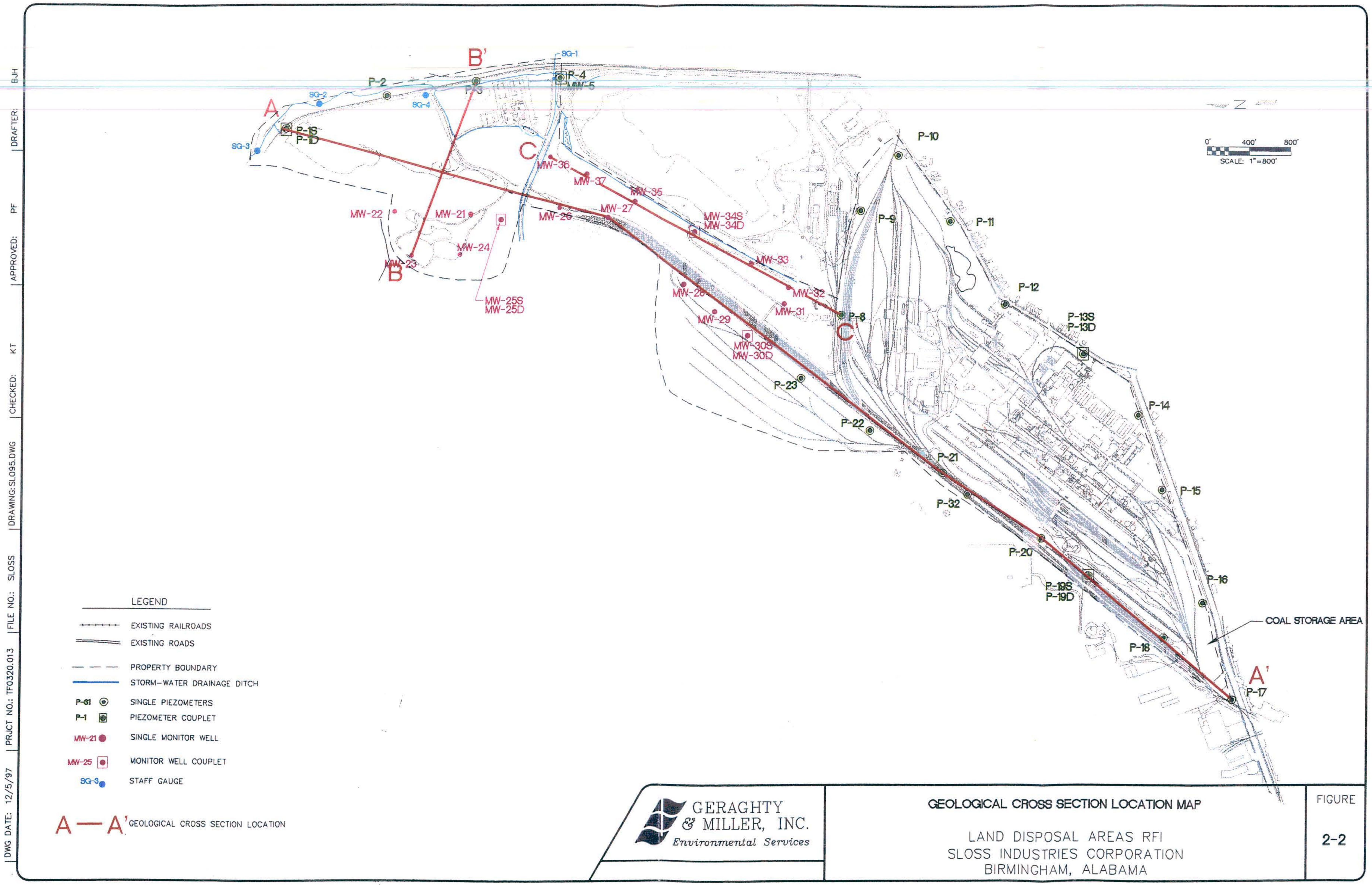


SOURCE: GEOLOGICAL SURVEY OF ALABAMA, ATLAS 14, 1979

GERAGHTY & MILLER, INC.
Environmental Services

TOPOGRAPHIC FEATURES AND PHYSIOGRAPHIC SECTION MAP
LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE 2-1


B'
SG-1
P-4
MW-5
P-2
P-3
SG-2
SG-4
A
P-1S
P-1D
SG-3
C
MW-36
MW-37
MW-35
MW-22
MW-21
MW-26
MW-27
MW-34S
MW-34D
MW-24
MW-23
B
MW-33
MW-25S
MW-25D
MW-28
MW-32
MW-31
P-8
C'
MW-29
MW-30S
MW-30D
P-23
P-22
P-21
P-32
P-20
P-19S
P-19D
P-18
A'
P-17
P-10
P-9
P-11
P-12
P-13S
P-13D
P-14
P-15
P-16
COAL STORAGE AREA
N
0' 400' 800'
SCALE: 1"=800'
LEGEND
EXISTING RAILROADS
EXISTING ROADS
PROPERTY BOUNDARY
STORM-WATER DRAINAGE DITCH
P-31 SINGLE PIEZOMETERS
P-1 PIEZOMETER COUPLET
MW-21 SINGLE MONITOR WELL
MW-25 MONITOR WELL COUPLET
SG-3 STAFF GAUGE
A — A' GEOLOGICAL CROSS SECTION LOCATION
GERAGHTY & MILLER, INC.
Environmental Services
GEOLOGICAL CROSS SECTION LOCATION MAP
LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA
FIGURE
2-2
DWG DATE: 12/5/97
PRJCT NO: TF0320.013
FILE NO.: SLOSS
DRAWING: SL095.DWG
CHECKED: KT
APPROVED: PF
DRAFTER: BJH

System	FORMATION	LITHOLOGY	THICKNESS
PENNSYLVANIAN	POTTSVILLE FORMATION (Pp)	ALTERNATING BEDS OF SANDSTONE AND SHALE WITH NUMEROUS COAL SEAMS AND ASSOCIATED BEDS OF UNDERCLAY ORTHOQUARTZITE AND QUARTZ PEBBLE CONGLOMERATE OCCUR AT BASE	100 TO 2800 FEET
PENNSYLVANIAN	PARKWOOD FORMATION (PMpw)	LIGHT TO MEDIUM GRAY, VERY FINE TO FINE GRAINED, ARGILLACEOUS, MICACEOUS SANDSTONE INTERBEDDED WITH MEDIUM TO DARK GRAY, FISSLE, MICAEOUS SHALE AND SILTSTONE.	0 TO 900 FEET
MISSISSIPPIAN	FLOYD SHALE (Mf)	DARK GRAY CLAY SHALE WITH LOCALLY OCCURRING THIN SILTSTONE BEDS.	0 TO 600 FEET
MISSISSIPPIAN	BANGOR LIMESTONE (Mb)	MEDIUM BEDDED, MEDIUM TO MEDIUM LIGHT GRAY, BIOCLASTIC OR OOLITIC LIMESTONE WITH LOCALLY OCCURING ARGILACEOUS AND SUBLITHOGRAPHIC LIMESTONE AND SHALE	0 TO 500 FEET
MISSISSIPPIAN	HARTSELLE SANDSTONE (Mh)	MEDIUM TO VERY THICK BEDDED, CLEAN, WELL SORTED, LIGHT COLORED, VERY FINE TO MEDIUM GRAINED, CROSS-BEDDED, QUARTZ SANDSTONE.	0 TO 120 FEET
MISSISSIPPIAN	PRIDE MOUNTAIN FORMATION (Mpm)	DARK GRAY, FISSLE, CLAY SHALE WITH THIN SANDSTONE AND SILTSTONE BEDS. BASAL OOLITIC LIMESTONE BED. CLAY SHALE INDISTINGUISHIBLE FROM THE FLOYD SHALE.	120 TO 400 FEET
MISSISSIPPIAN	TUSCUMBIA LIMESTONE (Mt)	THICK BEDDED, MEDIUM DARK TO MEDIUM GRAY CRYSTALLINE, OOLITIC SUBLITHOGRAPHIC AND BIOCLASTIC LIMESTONE WITH MINOR AMOUNTS OF CHERT.	70 TO 110 FEET
MISSISSIPPIAN	FORT PAYNE CHERT (Mfp)	GRAYISH ORANGE TO LIGHT GRAY, BEDDED, FOSSILIFEROUS CHERT. GENERALLY HIGHLY WEATHERED IN OUTCROP. GREENISH-GRAY TO GRAYISH RED THINLY LAMINATED SHALE COMMONLY OCCURS AT BASE (MAURY FORMATION).	90 TO 200 FEET
DEVONIAN	CHATTANOOGA SHALE (Dc)	BROWNISH-BLACK, FISSLE, SILTY SHALE.	0 TO 10 FEET
DEVONIAN	FROG MOUNTAIN SANDSTONE (Dfm)	MEDIUM TO THICK BEDDED, DUSKY RED AND LIGHT TO DARK GRAY, COARSE GRAINED, HEMATITIC SANDSTONE AND LIGHT TO DARK GRAY HEMATITIC SANDSTONE AND PEBBLE CONGLOMERATE.	0 TO 36 FEET
DEVONIAN	DEVONIAN UNDIFFERENTIATED (Du)	LIGHT OLIVE GRAY TO WHITE TO YELOWISH GRAY, FINELY CRYSTALLINE SILICEOUS, CHERTY, GLAUCONITIC, DOLOMITIC LIMESTONE	0 TO 120 FEET
SILURIAN	RED MOUNTAIN FORMATION (Srm)	DARK-REDISH-BROWN TO OLIVE GRAY SILTSTONE, SANDSTONE, OCCASIONAL THIN BED OF LIMESTONE, AND SHALE WITH HEMATITE BEDS 5-30 FEET THICK.	200 TO 500 FEET
ORDOVICIAN	CHICKAMAUGA LIMESTONE (Oc)	THIN TO MEDIUM BEDDED SUBLITHOGRAPHIC LIMESTONE WITH SOME ARGILLACEOUS AND CRYSTALLINE LIMESTONE, SHALE, AND BENTONITE INTERBEDS. BASAL CHERT CONGLOMERATE PRESENT(ATTALLA CHERT).	200 TO 500 FEET
ORDOVICIAN	KNOX GROUP UNDIFFERENTIATED (OCk)	THICK BEDDED, MEDIUM TO LIGHT GRAY CHERTY DOLOMITE WITH LESSER AMOUNT OF LIMESTONE AND DOLOMITIC LIMESTONE	1500 TO 3000 FEET
CAMBRIAN	KETONA DOLOMITE (Ckt)	THICK BEDDED, LIGHT BROWNISH GRAY TO YELLOWISH GRAY, CRYSTALLINE DOLOMITE.	0 TO 600 FEET
CAMBRIAN	CONASAUGA FORMATION (Cc)	THIN BEDDED, DARK TO BROWNISH GRAY, SUBLITHOGRAPHIC SHALEY LIMESTONE	1100 TO 1900 FEET

GERAGHTY & MILLER, INC.
Environmental Services

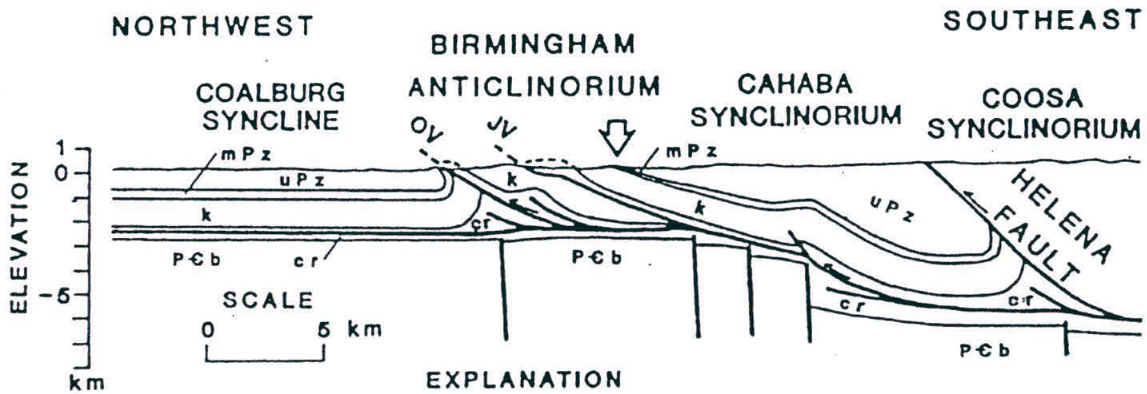
GENERALIZED GEOLOGIC STRATIGRAPHIC SECTION

LAND DISPOSAL AREAS RFI

SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE **2-3**

DWG DATE: 12/5/97 | PRJCT NO.: X | FILE NO.: SLOSS | DRAWING: SLO-LITH.DWG | CHECKED: JH | APPROVED: PF | DRAFTER: BJH



EXPLANATION

uPz	MISSISSIPPIAN-PENNSYLVANIAN
mPz	MIDDLE-UPPER ORDOVICIAN, SILURIAN
k	CAMBRIAN-ORDOVICIAN KNOX GROUP
cr	CAMBRIAN ROME AND CONASAUGA FORMATIONS
P€b	PRECAMBRIAN BASEMENT ROCKS
OV	OPOSSUM VALLEY FAULT
JV	JONES VALLEY FAULT

⇩ LOCATION OF RED MOUNTAIN EXPRESSWAY

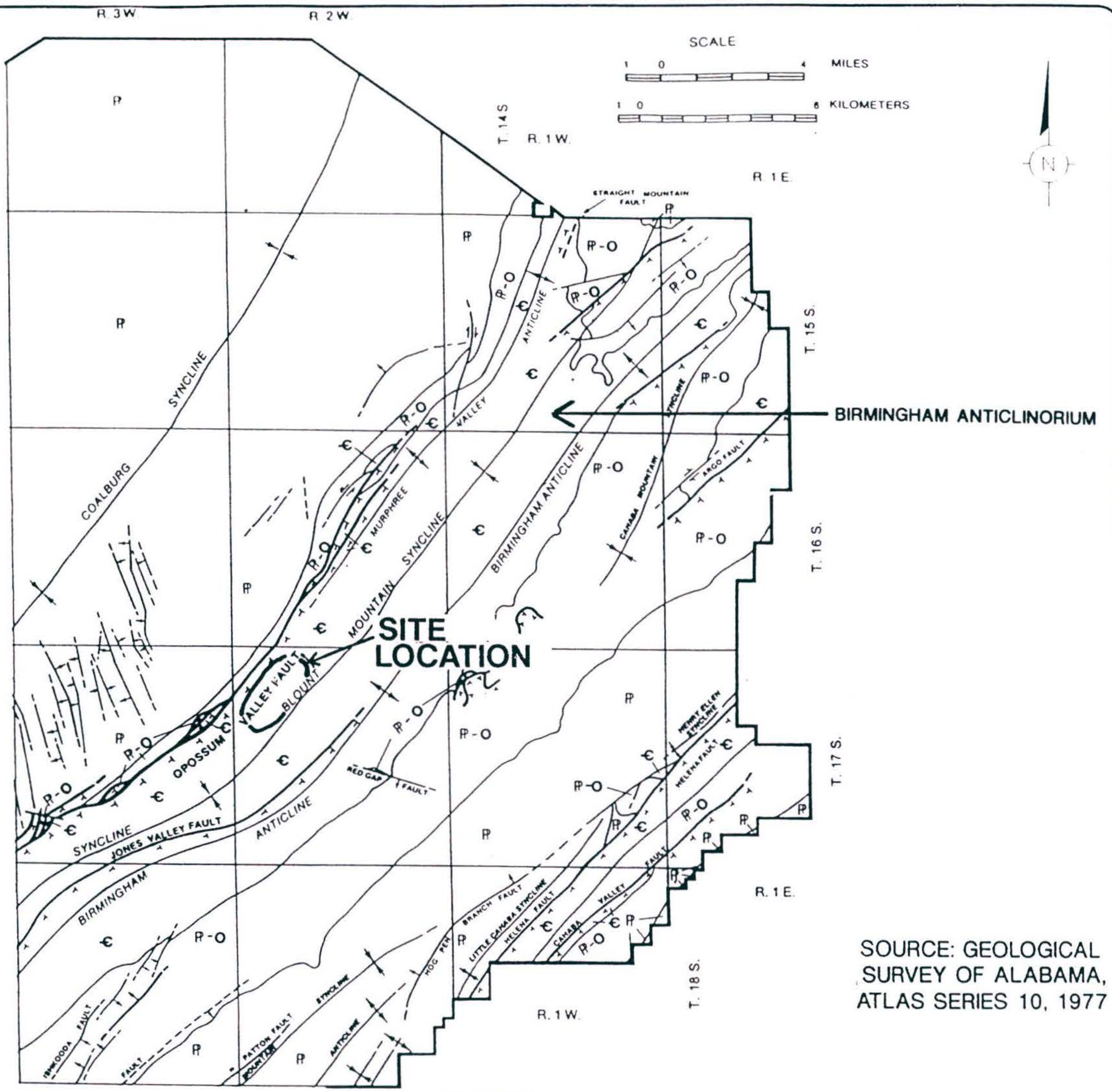
SOURCE: THOMAS AND BEARCE, 1986

GERAGHTY & MILLER, INC.
Environmental Services

STRUCTURAL CROSS SECTION OF THE VALLEY AND RIDGE PROVINCE

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE 2-4



EXPLANATION

Pennsylvanian	P	Pottsville Formation
Pennsylvanian to Ordovician	P-O	Parkwood Formation, Floyd Shale, Bangor Limestone, Hartselle Sandstone, Pride Mountain Formation, Tuscumbia Limestone, Fort Payne Chert, Maury Formation, Chattanooga Shale, Frog Mountain Sandstone, Red Mountain Formation, Chickamauga Limestone, Attalla Chert Conglomerate Member of Chickamauga Limestone, and Ordovician undifferentiated
Cambrian (includes some Early Ordovician rocks in the Cahaba Valley)	€	Knox Group undifferentiated, Ketona Dolomite, Conasauga Formation, and Rome Formation

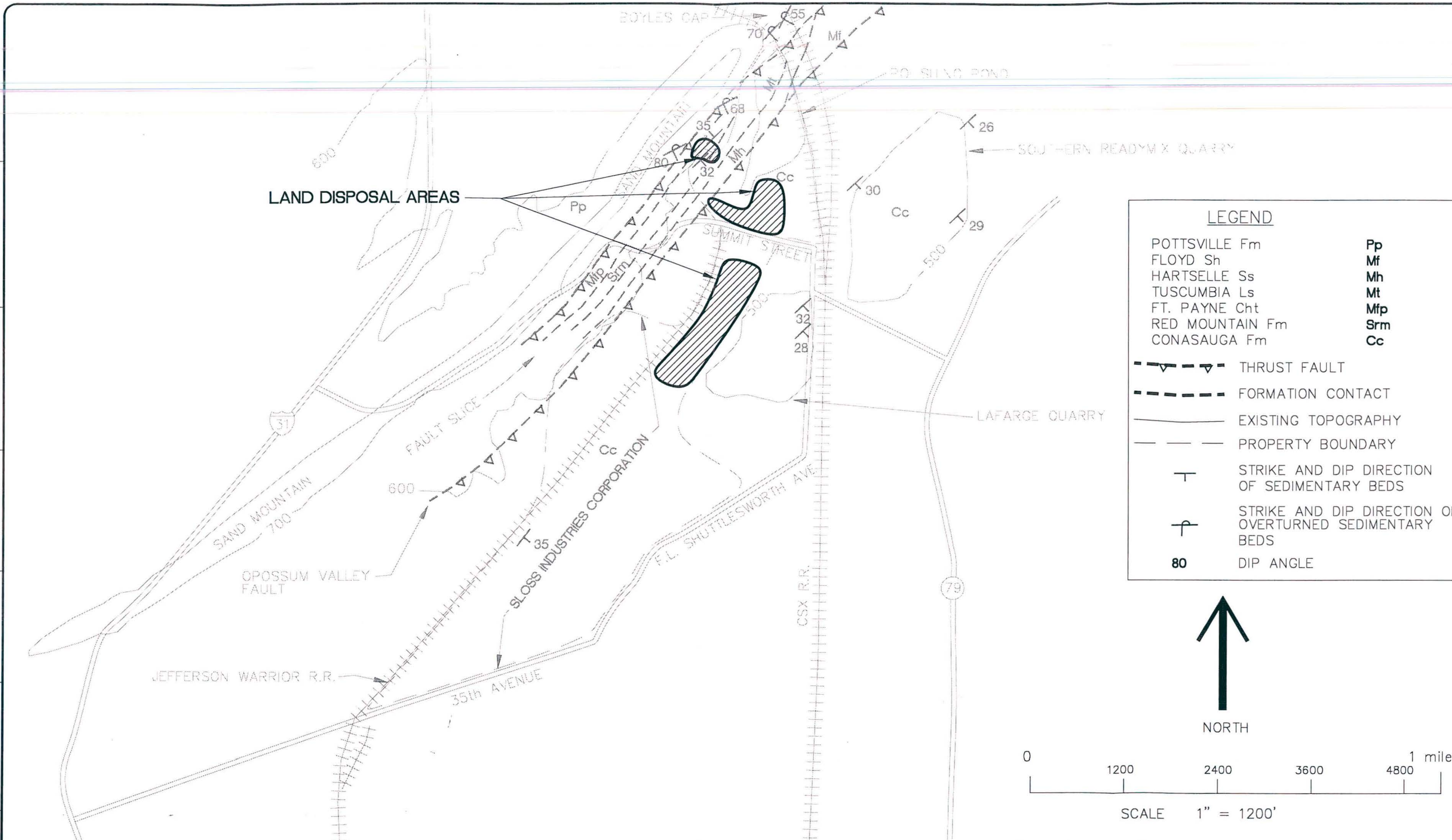
(Cretaceous and Holocene deposits occur locally but are not shown)

Anticlinal axis
Anticlinal axis showing direction of plunge
Synclinal axis
Synclinal axis showing direction of plunge
Normal fault, arrow on downthrown side
Thrust fault, T on upper plate
Fault, showing relative horizontal movement
Reverse fault, R on upthrown side
Contact
Dashed where inferred

GERAGHTY & MILLER, INC.
Environmental Services

GENERALIZED GEOLOGY OF EASTERN JEFFERSON COUNTY, ALABAMA
LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE 2-5



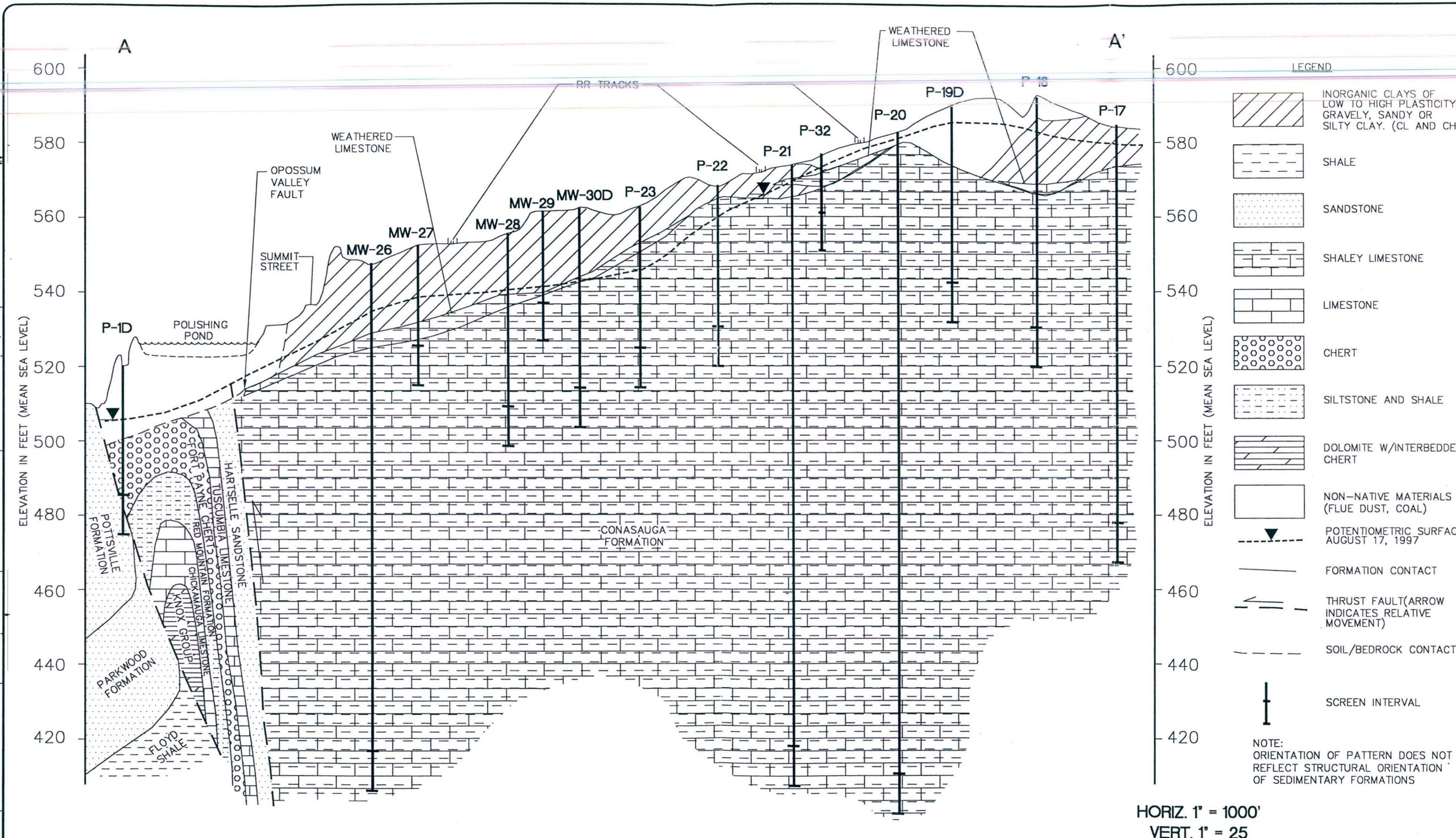
GERAGHTY & MILLER, INC.
Environmental Services

GEOLOGY OF THE SLOSS PROPERTY AND VICINITY

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES
BIRMINGHAM, ALABAMA

FIGURE 2-6

DWG DATE: 12/5/97 | PRJCT NO.: TF0318.001 | FILE NO.: SLOSS | DRAWING: SLO-GEO.DWG | CHECKED: KT | APPROVED: PF | DRAFTER: BJH



GERAGHTY & MILLER, INC.
Environmental Services

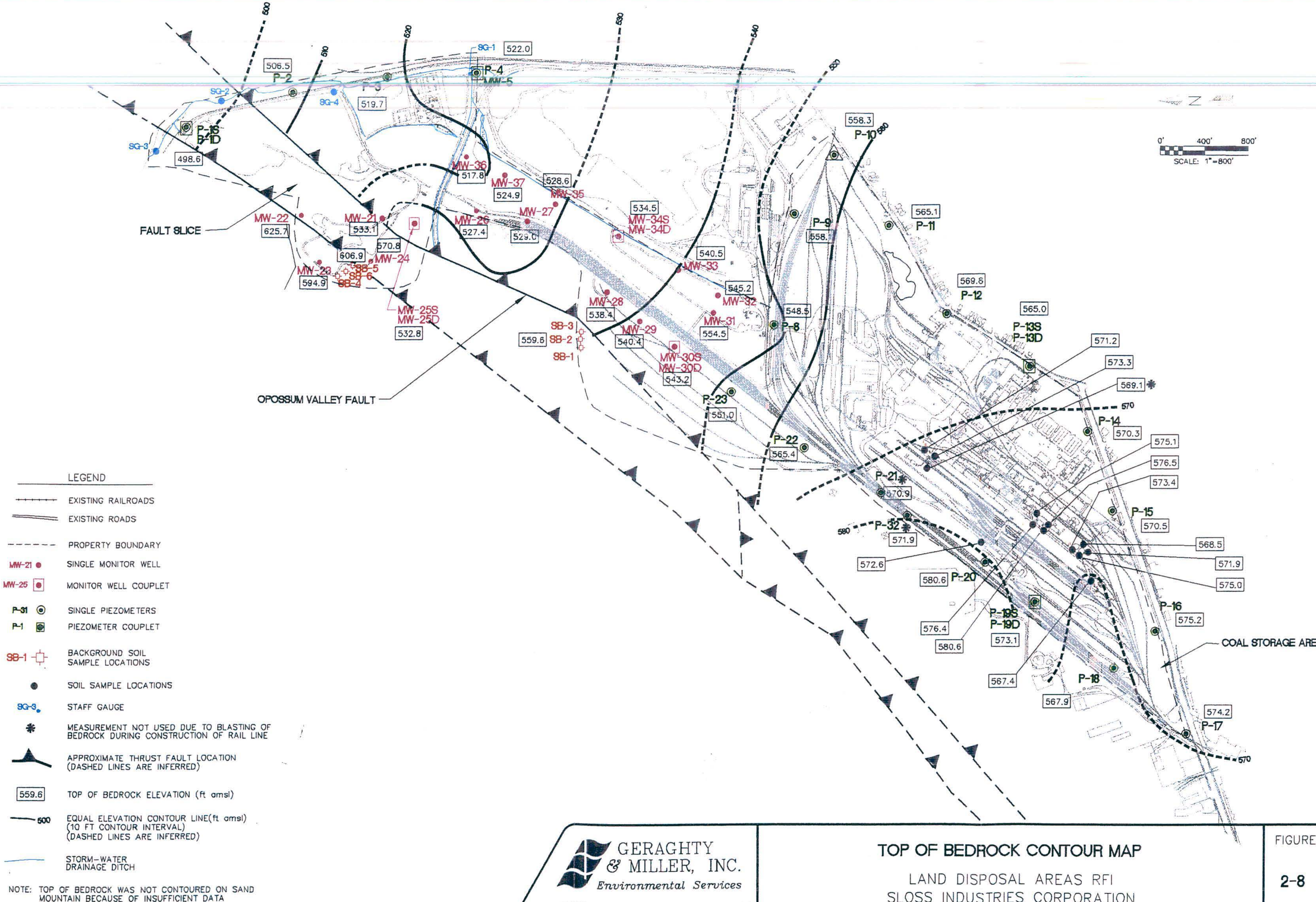
GEOLOGICAL CROSS SECTION A - A'

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE 2-7

DWG DATE: 1/12/98 | PRJCT NO.: TF0318.001 | FILE NO.: SLOSS | DRAWING: SLO-S3.DWG | CHECKED: KT | APPROVED: PF | DRAFTER: BJH

DWG DATE: 12/4/97 | PRJCT NO.: TF0320.013 | FILE NO.: SLOSS | DRAWING:SLO95.DWG | CHECKED: KT | APPROVED: PF | DRAFTER: BJH



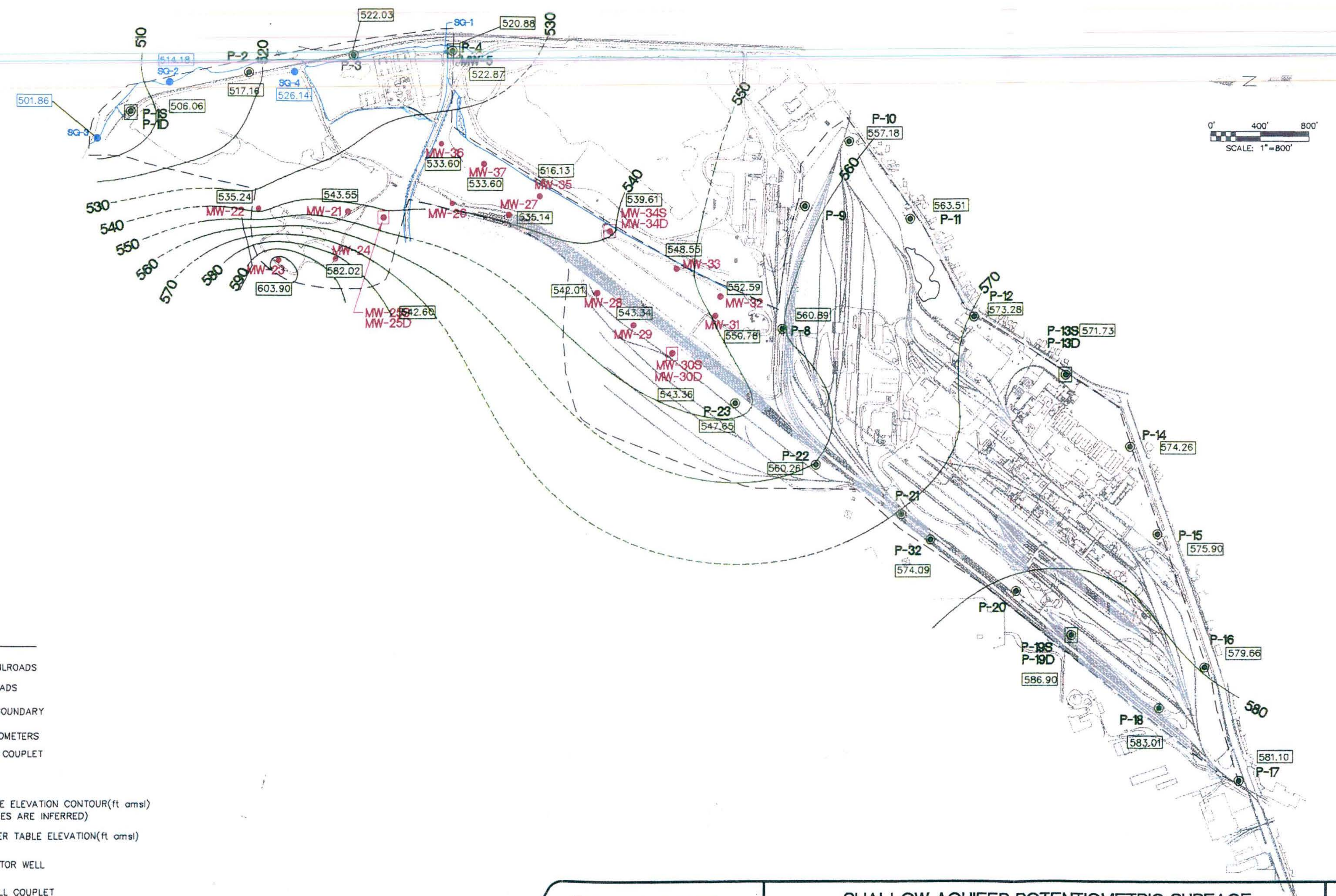
GERAGHTY & MILLER, INC.
Environmental Services

TOP OF BEDROCK CONTOUR MAP

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE 2-8

DWG DATE: 12/5/97 | PRJCT NO.: TF0320.013 | FILE NO.: SLOSS | DRAWING: SLO95.DWG | CHECKED: KT | APPROVED: PF | DRAFTER: BJH



LEGEND

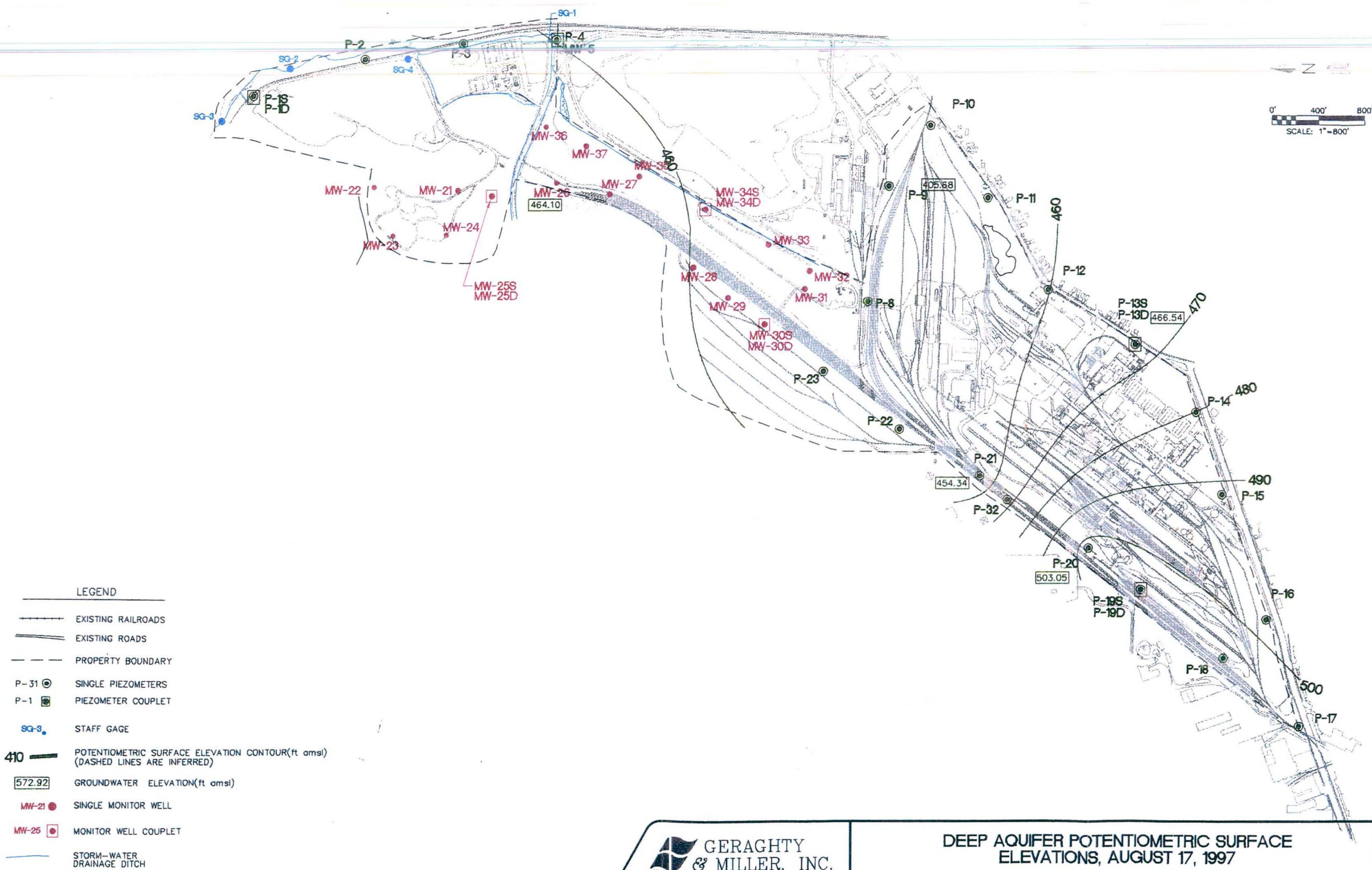
——+——+——	EXISTING RAILROADS
═══	EXISTING ROADS
— — —	PROPERTY BOUNDARY
P-31 ⊙	SINGLE PIEZOMETERS
P-1 ▣	PIEZOMETER COUPLET
SG-3	STAFF GAGE
580 ——	WATER TABLE ELEVATION CONTOUR(ft amsl) (DASHED LINES ARE INFERRED)
572.92	GROUNDWATER TABLE ELEVATION(ft amsl)
MW-21 ●	SINGLE MONITOR WELL
MW-25 ▣	MONITOR WELL COUPLET
——	STORM-WATER DRAINAGE DITCH

GERAGHTY & MILLER, INC.
Environmental Services

SHALLOW AQUIFER POTENTIOMETRIC SURFACE ELEVATIONS, AUGUST 17, 1997

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE
2-9



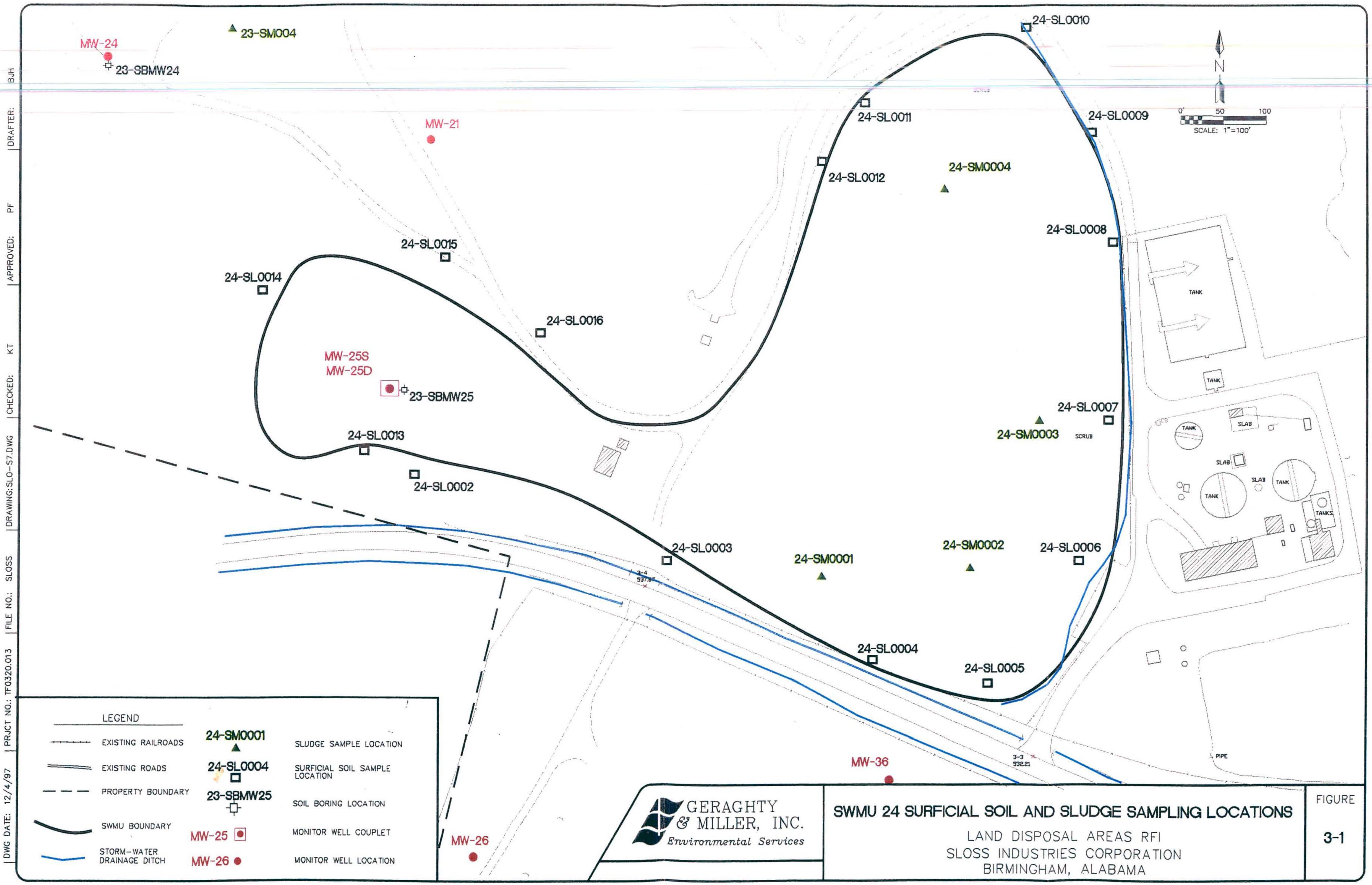
GERAGHTY & MILLER, INC.
Environmental Services

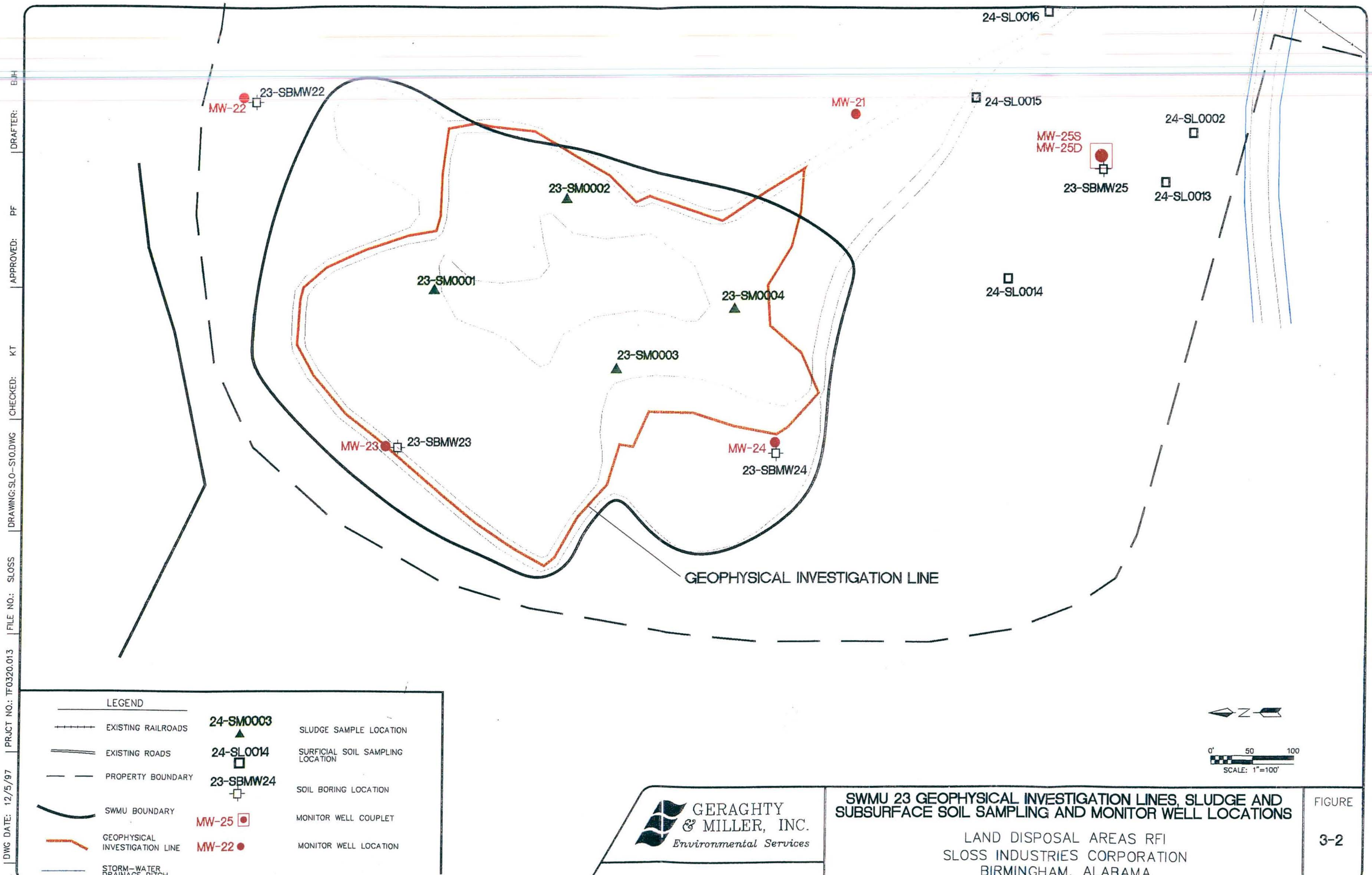
DEEP AQUIFER POTENTIOMETRIC SURFACE ELEVATIONS, AUGUST 17, 1997

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE 2-10

DWG DATE: 12/5/97 | PRJCT NO.: TF0320.013 | FILE NO.: SLOSS | DRAWING: SLO95.DWG | CHECKED: KT | APPROVED: PF | DRAFTER: BJH


MW-24
23-SBMW24
23-SM004
MW-21
24-SL0010
24-SL0011
24-SL0009
24-SL0012
24-SM0004
24-SL0008
24-SL0015
24-SL0014
24-SL0016
MW-25S
MW-25D
23-SBMW25
24-SL0013
24-SL0002
24-SL0007
24-SM0003
24-SL0003
24-SM0001
24-SM0002
24-SL0006
24-SL0004
24-SL0005
MW-36
MW-26
TANK
SLAB
TANKS
PIPE
N
0' 50 100
SCALE: 1"=100'
LEGEND
EXISTING RAILROADS
EXISTING ROADS
PROPERTY BOUNDARY
SWMU BOUNDARY
STORM-WATER DRAINAGE DITCH
24-SM0001 SLUDGE SAMPLE LOCATION
24-SL0004 SURFICIAL SOIL SAMPLE LOCATION
23-SBMW25 SOIL BORING LOCATION
MW-25 MONITOR WELL COUPLET
MW-26 MONITOR WELL LOCATION
GERAGHTY & MILLER, INC.
Environmental Services
SWMU 24 SURFICIAL SOIL AND SLUDGE SAMPLING LOCATIONS
LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA
FIGURE
3-1
DWG DATE: 12/4/97
PRJCT NO.: TF0320.013
FILE NO.: SLOSS
DRAWING: SLO-S7.DWG
CHECKED: KT
APPROVED: PF
DRAFTER: BJH

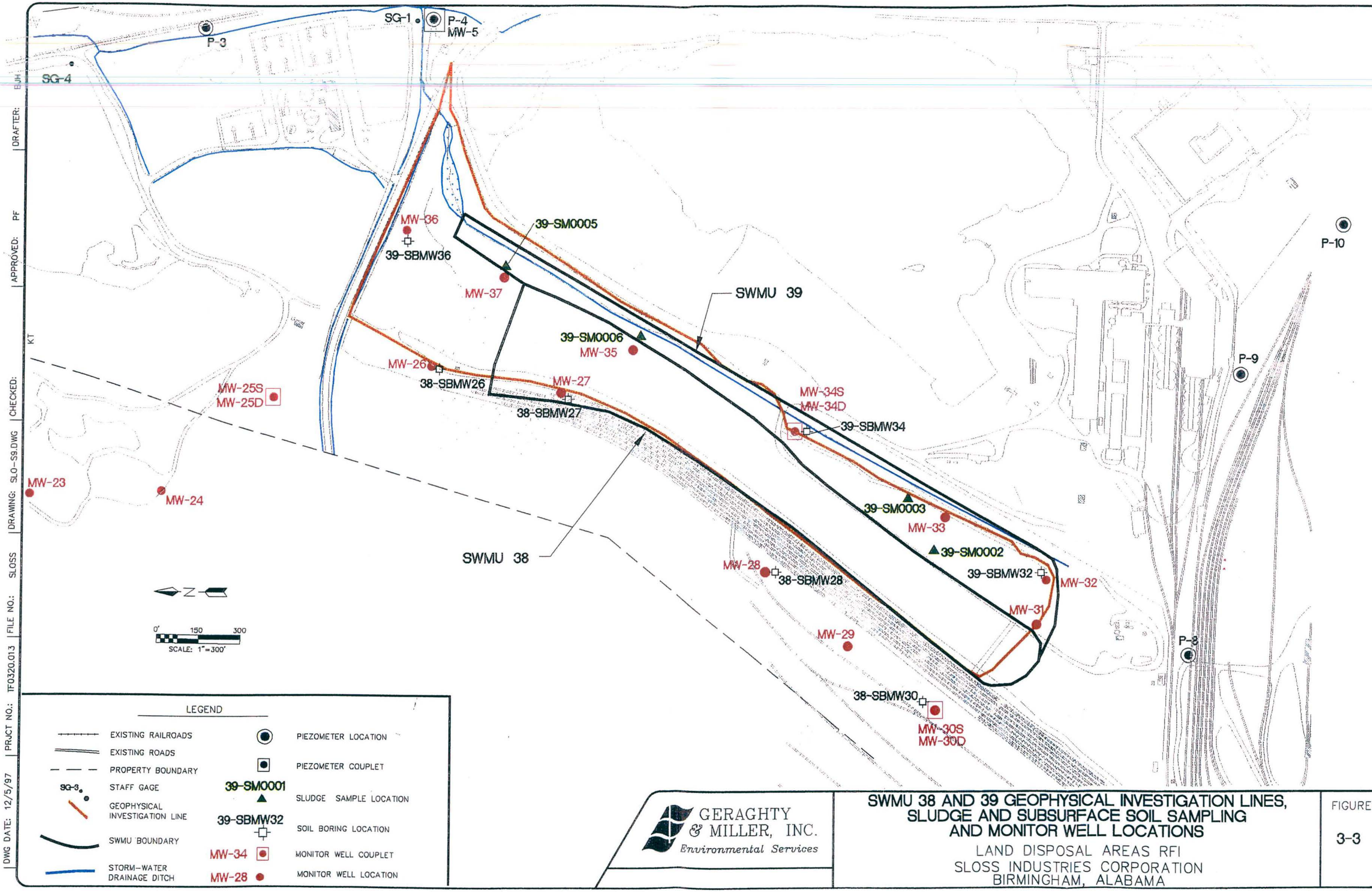


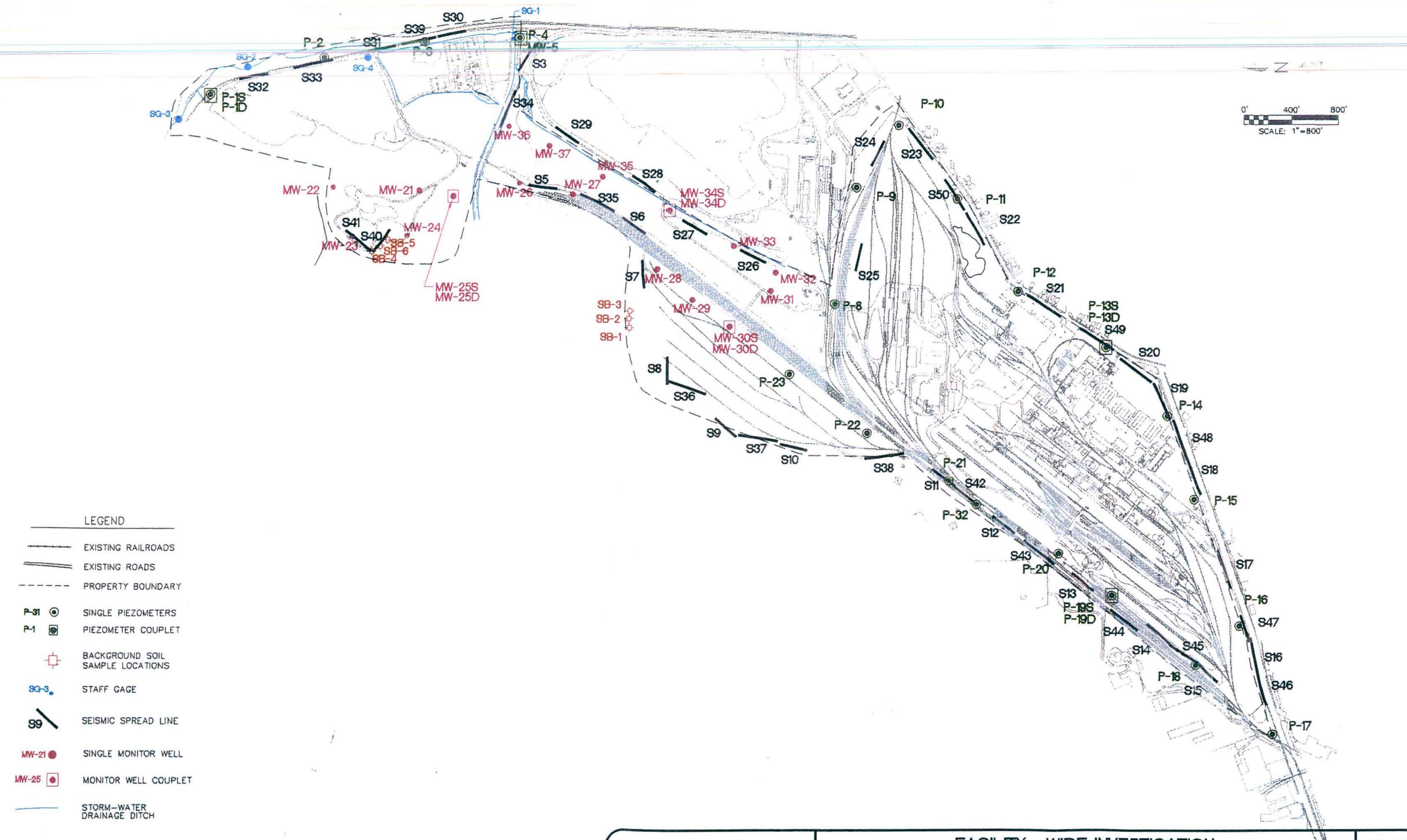
GERAGHTY & MILLER, INC.
Environmental Services

SWMU 23 GEOPHYSICAL INVESTIGATION LINES, SLUDGE AND SUBSURFACE SOIL SAMPLING AND MONITOR WELL LOCATIONS

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE 3-2


SWMU 38 AND 39 GEOPHYSICAL INVESTIGATION LINES, SLUDGE AND SUBSURFACE SOIL SAMPLING AND MONITOR WELL LOCATIONS
LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA
FIGURE
3-3
GERAGHTY & MILLER, INC.
Environmental Services
LEGEND
EXISTING RAILROADS
EXISTING ROADS
PROPERTY BOUNDARY
STAFF GAGE
GEOPHYSICAL INVESTIGATION LINE
SWMU BOUNDARY
STORM-WATER DRAINAGE DITCH
PIEZOMETER LOCATION
PIEZOMETER COUPLET
39-SM0001
SLUDGE SAMPLE LOCATION
39-SBMW32
SOIL BORING LOCATION
MW-34
MONITOR WELL COUPLET
MW-28
MONITOR WELL LOCATION
SCALE: 1"=300'
0' 150 300
SWMU 39
SWMU 38
SG-1
SG-4
P-3
P-4
MW-5
P-8
P-9
P-10
MW-23
MW-24
MW-25S
MW-25D
MW-26
38-SBMW26
MW-27
38-SBMW27
MW-28
38-SBMW28
MW-29
38-SBMW30
MW-30S
MW-30D
MW-31
MW-32
39-SBMW32
MW-33
MW-34S
MW-34D
39-SBMW34
MW-35
MW-36
39-SBMW36
MW-37
39-SM0002
39-SM0003
39-SM0005
39-SM0006
DWG DATE: 12/5/97
PRJCT NO.: TF0320.013
FILE NO.: SLOSS
DRAWING: SLO-S9.DWG
CHECKED: KT
APPROVED: PF
DRAFTER: BJH



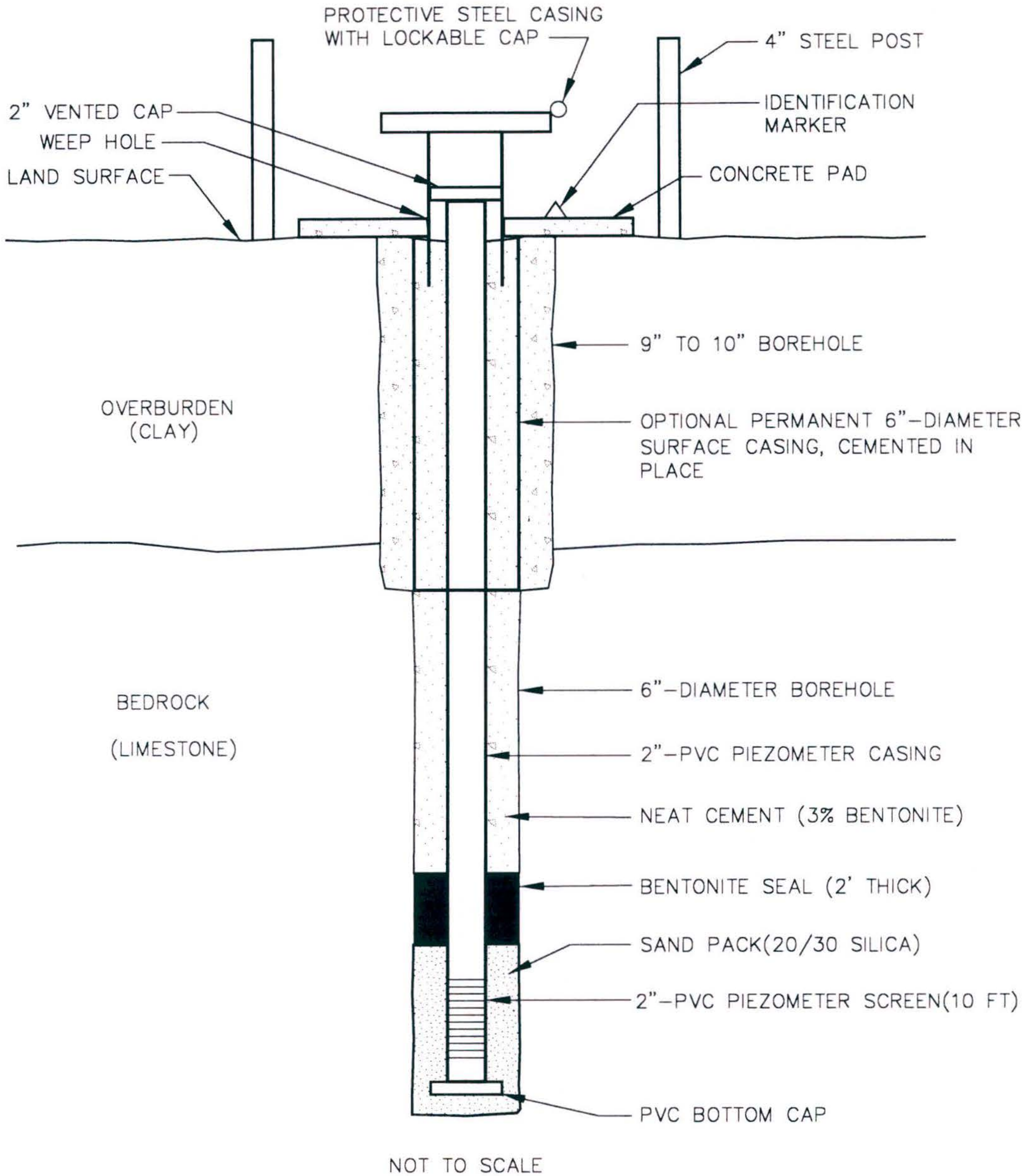
GERAGHTY & MILLER, INC.
Environmental Services

FACILITY - WIDE INVESTIGATION
SIESMIC INVESTIGATION LOCATIONS

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE
3-4

DWG DATE: 12/5/97 | PRJCT NO: TF0320.013 | FILE NO.: SLOSS | DRAWING: SLO95.DWG | CHECKED: KT | APPROVED: PF | DRAFTER: BJH



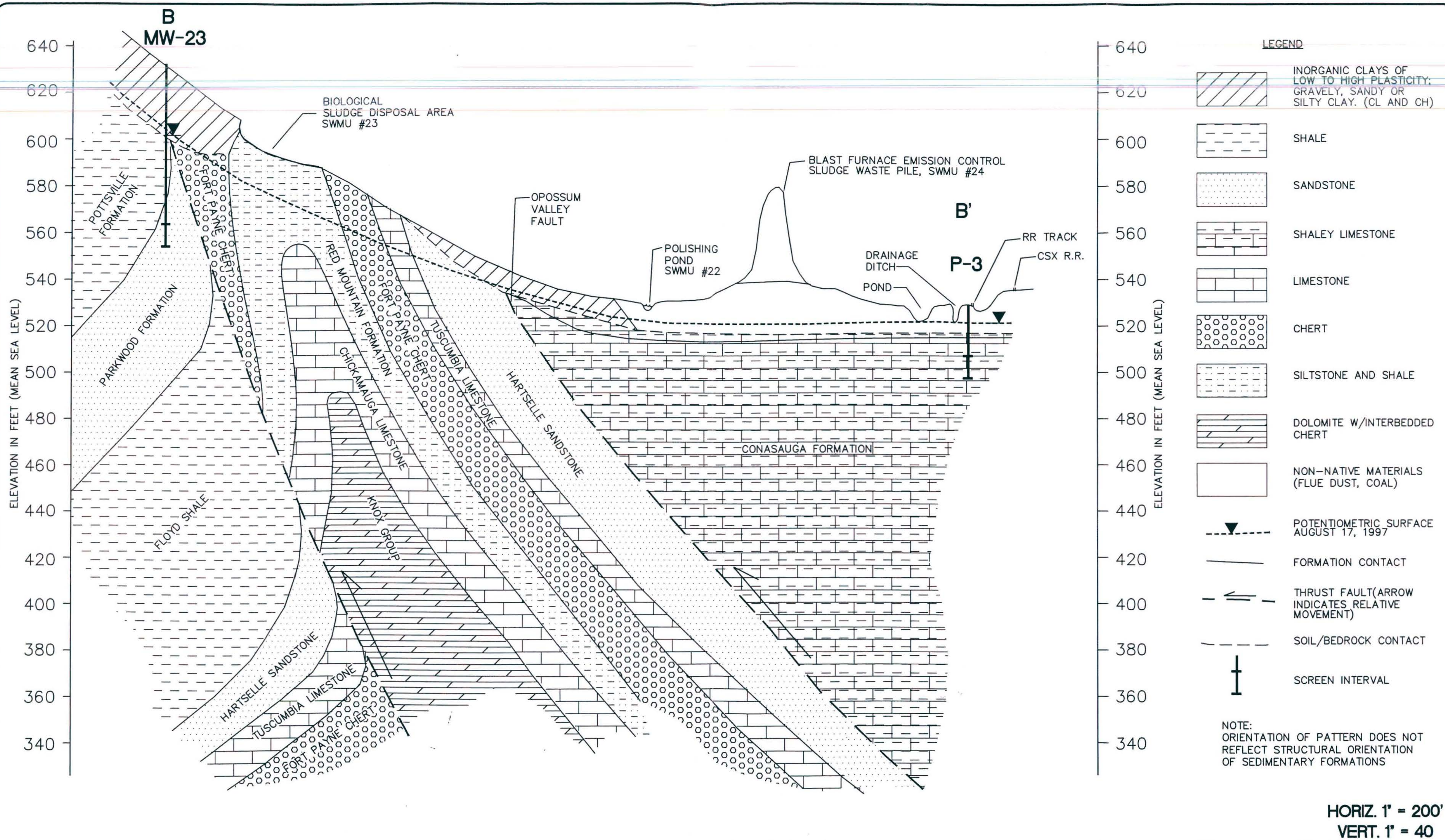
DWG DATE: 12/5/97 | PRJCT NO.: TF0320.013 | DRAWING: SLO-PIEZ.DWG | FILE NO.: SLOSS | CHECKED: JK | APPROVED: PF | DRAFTER: BJH

GERAGHTY & MILLER, INC.
Environmental Services

TYPICAL BEDROCK MONITOR WELL DESIGN

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE
3-5



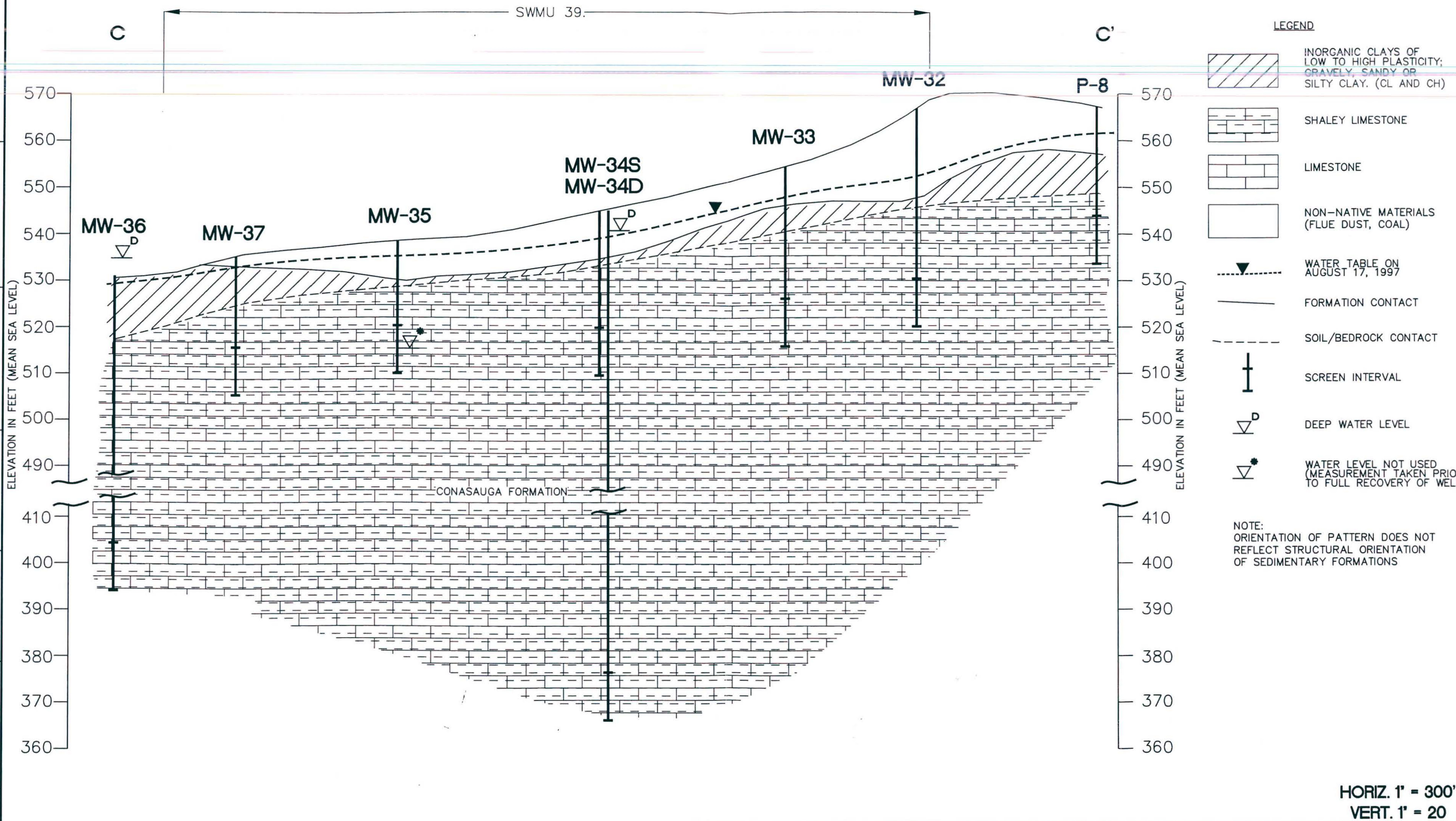
DWG DATE: 12/5/97 | PRJCT NO.: TF0318.001 | FILE NO.: SLOSS | DRAWING: SLO-S1.DWG | CHECKED: KT | APPROVED: PF | DRAFTER: BJH

GERAGHTY & MILLER, INC.
Environmental Services

GEOLOGICAL CROSS SECTION B - B'

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE 4-1



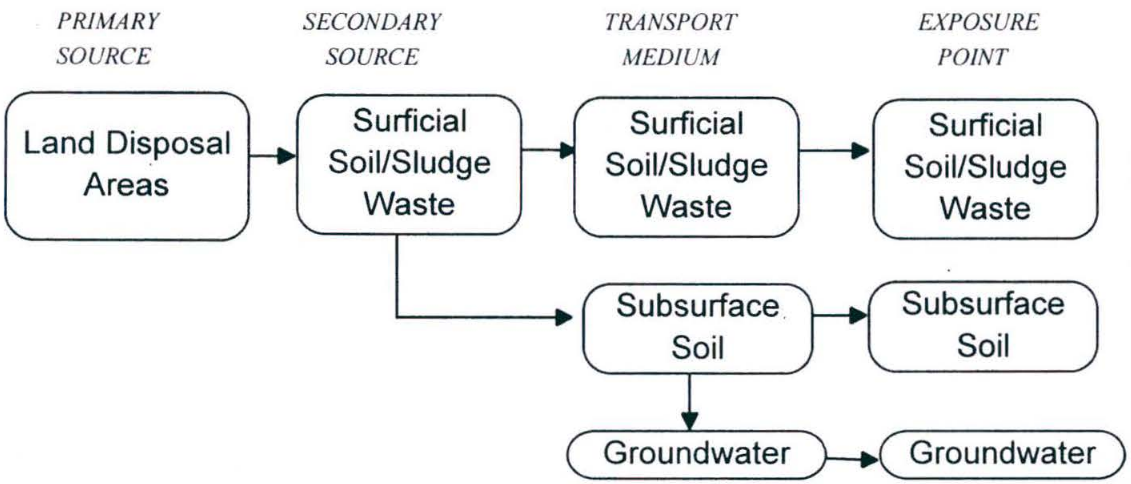
DWG DATE: 12/5/97 | PRJCT NO.: TF0318.001 | FILE NO.: SLOSS | DRAWING: SLO-SECT.DWG | CHECKED: KT | APPROVED: PF | DRAFTER: JJH

GERAGHTY & MILLER, INC.
Environmental Services

GEOLOGICAL CROSS SECTION C - C'

LAND DISPOSAL AREAS RFI
SLOSS INDUSTRIES CORPORATION
BIRMINGHAM, ALABAMA

FIGURE 4-2



RECEPTORS

Exposure Point	EXPOSURE ROUTE	HUMAN – CURRENT: SITE WORKER	HUMAN – FUTURE: SITE WORKER	HUMAN – FUTURE: CONSTRUCTION WORKER	BIOTA: TERRESTRIAL	BIOTA: AQUATIC
Surficial Soil/Sludge Waste	*Oral*	•	•	•	•	
	Dermal	•	•	•	•	
	Inhalation	•	•	•		
Subsurface Soil	*Oral*			•		
	Dermal			•		
	Inhalation			•		
Groundwater	*Oral*					
	Dermal					
	Inhalation					

GERAGHTY & MILLER, INC.
Environment and Infrastructure
a heidemij company

CONCEPTUAL SITE MODEL FOR POTENTIAL EXPOSURE

Land Disposal Areas RFI
Sloss Industries Corporation
Birmingham, Alabama

Figure 5-1

g:\proj\tf320\landdisp\rpt\Csm.xls

TABLE 1-1
Summary of SWMUs
Land Disposal Areas RFI
Sloss Industries Corporation

SWMU No.	Name	Description	RFA Recommendation
Land Disposal Area SWMUs			
23	Biological Sludge Disposal Area	Land Disposal Area	FA
24	Blast Furnace Emission Control Sludge Waste Pile	Land Disposal Area	FA
38	Landfill	Land Disposal Area	FA
39	Blast Furnace Emission Control Sludge Waste Pile Near Landfill	Land Disposal Area	FA
Coke Manufacturing Plant SWMUs			
1	Quench Towers and Sump	Concrete tower and sump	FA
2	Quench Tower Pump Basins	Inground concrete tank	FA
3	Old Quench Tower Settling Basins	Inground concrete tank	FA
5	Coal Tar Storage Area Drain System	Inground concrete trough	FA
6	Spill Area Around Diesel Tank	Aboveground Tank	FA
7	Coal Tar Collection Sump in No. 1 Pump House	Concrete sump	FA
8	Flushing Liquor Decanter	Aboveground tank	FA
9	Flushing Liquor Decanter Sump	Concrete sump	FA
10	Coal Tar Decanter for No. 3 and No. 4 Coke Batteries	Aboveground tank	FA
11	Coal Tar Decanter for No. 5 Coke Battery	Aboveground tank	FA
12	Coal Tar Decanter for No. 1 and No. 2 Coke Batteries	Aboveground steel tank	FA
Biological Treatment Facility (BTF) and Sewers SWMUs			
4	BTF Sewer	Inground sewer line	FA
13	BTF Equalization Basin	Surface impoundment	FA
14	BTF Neutralization Basin	Inground concrete tank	NFA
15	BTF Primary Clarifier	Inground concrete tank	NFA
16	BTF Aeration Basin	Inground concrete tank	NFA
17	BTF Secondary Clarifier	Inground concrete tank	NFA
18	BTF Thickener	Inground concrete tank	NFA
19	BTF Digester	Inground concrete tank	NFA
20	Dewatering Machine	Filter press	NFA
21	BTF Emergency Basin	Surface impoundment	FA
22	Polishing Pond	Surface impoundment	FA
25	Storm-Water Runoff Sewer	Inground sewer line	FA
37	BTF Sewer Tar Trap	Inground concrete basin	FA

TABLE 1-1
Summary of SWMUs
Land Disposal Areas RFI
Sloss Industries Corporation

SWMU No.	Name	Description	RFA Recommendation
Chemical Manufacturing Plant SWMUs			
26	Chemical Manufacturing Plant Main Process Building Floor Drain	Tile-lined trough	FA
27	TSA 94 Building Drain Floor	Tile-lined trough	FA
28	Sulfonation Building Floor Drain	Stainless Steel trough	NFA
29	Chemical Product Tank Containment Area	Concrete containment area	FA
30	Centrifuge Wastewater Tank	Aboveground Steel Tank	NFA
31	Monohydrate Building Floor Drain and Sump	Concrete drain and sump	FA
32	BSC 94 Drum Storage Area	Plastic drums	NFA
33	BSC Plant Drum Storage Area	Plastic drums	NFA
34	BSC Wastewater Neutralization System	Concrete containment	NFA
35	Old Waste Pile at Mineral Wool Plant	Land Disposal Area	NFA
36	Maintenance Shop Used Oil Tank	Aboveground tank	FA

FA Further Action.
NFA No Further Action.

TABLE 2-1
Summary of Constituents Detected in Background Soil Samples
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	USEPA RBC	950615-FW-00-SL0001(0-2)		950615-FW-00-SL0001(8-10)		950615-FW-00-SL0001(14-16)		950615-FW-00-SL0002(0-2)		950615-FW-00-SL0002(8-10)	
SAMPLE DATE	Ingestion	06/15/95		06/15/95		06/15/95		06/15/95		06/15/95	
MATRIX	Soil	SOIL		SOIL		SOIL		SOIL		SOIL	
SL LOG NUMBER	Industrial [1/]	T511787*1		T511787*2		T511787*3		T511787*4		T511787*5	
Volatile Organic Compounds (ug/kg dw):											
1,1,2-Trichloroethane	100,000	< 5.8		< 5.8		< 7.2		0.67	J	2.6	J
Methylene chloride (Dichloromethane)	760,000	< 5.8		3.6	J	< 7.2		4.3	J	< 6.1	
Tetrachloroethene	110,000	< 5.8		< 5.8		< 7.2		0.58	J	< 6.1	
Toluene	410,000,000	5.8	U	1.1	J	1.0	J	6.2	U	3.3	J
Trichloroethene	520,000	< 5.8		< 5.8		< 7.2		< 6.2		< 6.1	
Semivolatile Organics (ug/kg dw):											
Benzo(a)anthracene	7,800	33	J	< 430		< 500		< 410		< 460	
Benzo(a)pyrene	780	40	J	< 430		< 500		< 410		< 460	
Benzo(b)fluoranthene	7,800	65	J	< 430		< 500		66	J	< 460	
Benzo(k)fluoranthene	78,000	< 390		< 430		< 500		< 410		< 460	
Bis(2-ethylhexyl)phthalate	410,000	< 390		< 430		< 500		< 410		< 460	
Chrysene	780	43	J	< 430		< 500		< 410		< 460	
Di-n-butylphthalate	200,000,000	< 390		< 430		< 500		< 410		< 460	
Di-n-octylphthalate	41,000,000	< 390		< 430		< 500		< 410		< 460	
Fluoranthene	82,000,000	58	J	< 430		< 500		61	J	< 460	
Naphthalene	82,000,000	44	J	< 430		< 500		48	J	< 460	
Phenanthrene	NS	30	J	< 430		< 500		< 410		< 460	
Pyrene	61,000,000	52	J	< 430		< 500		< 410		< 460	
Metals (mg/kg dw):											
Arsenic	3.8 [2/]	11		7.2		4.3		16		6.6	
Barium	140,000	44		85		100		51		120	
Beryllium	1.3	0.69		1.8		2.2		0.87		1.7	
Chromium	10,000 [3/]	16		25		27		39		32	
Copper	1,000,000	8.2		18		32		6.7		20	
Lead	400 [4/]	23		8.7		9.7		20		9.3	
Mercury	610	0.038		0.039		0.056		0.034		0.049	
Nickel	41,000	4.7		22		40		5.5		36	
Thallium	NS	< 1		1.3		< 1		1.1		< 1	
Zinc	610,000	67		28		71		38		52	
Percent Solids		85 %		78 %		67 %		82 %		72 %	

Footnotes on Page 5

TABLE 2-1
Summary of Constituents Detected in Background Soil Samples
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	USEPA RBC	950615-FW-00-SL0002(12-14)	950615-FW-00-SL0003(0-2)	950615-FW-00-SL0003(6-8)	950615-FW-00-SL0003(10-12)	950615-FW-00-SL9003
SAMPLE DATE	Ingestion	06/15/95	06/15/95	06/15/95	06/15/95	06/15/95
MATRIX	Soil	SOIL	SOIL	SOIL	SOIL	SOIL
SL LOG NUMBER	Industrial [1]	T511787*6	T511787*7	T511787*8	T511787*9	T511787*10
Volatile Organic Compounds (ug/kg dw):						
1,1,2-Trichloroethane	100,000	0.57 J	< 6.1	0.74 J	0.86 J	< 6.1
Methylene chloride (Dichloromethane)	760,000	5.5 J	2.8 J	< 6.6	< 7.4	< 6.1
Tetrachloroethene	110,000	< 6.9	< 6.1	< 6.6	< 7.4	< 6.1
Toluene	410,000,000	1.1 J	6.1 U	1.4 J	2 J	6.1 U
Trichloroethene	520,000	< 6.9	< 6.1	< 6.6	< 7.4	< 6.1
Semivolatile Organics (ug/kg dw):						
Benzo(a)anthracene	7,800	< 480	< 410	< 460	< 490	< 410
Benzo(a)pyrene	780	< 480	< 410	< 460	< 490	< 410
Benzo(b)fluoranthene	7,800	< 480	< 410	< 460	< 490	< 410
Benzo(k)fluoranthene	78,000	< 480	< 410	< 460	< 490	< 410
Bis(2-ethylhexyl)phthalate	410,000	< 480	31 J	< 460	< 490	< 410
Chrysene	780	< 480	< 410	< 460	< 490	< 410
Di-n-butylphthalate	200,000,000	< 480	< 410	< 460	< 490	< 410
Di-n-octylphthalate	41,000,000	< 480	< 410	< 460	< 490	16 J
Fluoranthene	82,000,000	< 480	< 410	< 460	< 490	< 410
Naphthalene	82,000,000	< 480	< 410	< 460	< 490	< 410
Phenanthrene	NS	< 480	< 410	< 460	< 490	< 410
Pyrene	61,000,000	< 480	< 410	< 460	< 490	< 410
Metals (mg/kg dw):						
Arsenic	3.8 [2]	5.7	14	9.7	5.1	21
Barium	140,000	200	53	100	95	50
Beryllium	1.3	2.5	0.51	1.8	2.6	0.60
Chromium	10,000 [3]	43	20	33	27	46
Copper	1,000,000	29	5.0	21	22	5.9
Lead	400 [4]	10	11	17	9.5	14
Mercury	610	0.065	0.055	0.035	0.15	0.038
Nickel	41,000	47	5.5	25	37	9.4
Thallium	NS	1.1	< 1	< 1	< 1	< 1
Zinc	610,000	68	16	29	49	27
Percent Solids		69 %	82 %	73 %	68 %	82 %

Footnotes on Page 5

j:\proj\tf320\landdisp\rpt\table\fwbgsl2.xls

ARCADIS GERAGHTY & MILLER

TABLE 2-1
Summary of Constituents Detected in Background Soil Samples
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	USEPA RBC		950629-FW-00-SL0004(0-2)			950629-FW-00-SL0004(16-18)			950629-FW-00-SL0004(36-38)			950719-FW-00-SL0005 (0-2)	
SAMPLE DATE	Ingestion		06/29/95			06/29/95			06/29/95			07/19/95	
MATRIX	Soil		SOIL			SOIL			WATER			SOIL	
SL LOG NUMBER	Industrial [1/]		T511949*4			T511949*5			T511949*1			T512142*3	
Volatile Organic Compounds (ug/kg dw):													
1,1,2-Trichloroethane	100,000	<	5.7		<	5.6		<	5.8		<	5.6	
Methylene chloride (Dichloromethane)	760,000	<	5.7			6.0		<	5.8		<	5.6	
Tetrachloroethene	110,000	<	5.7		<	5.6		<	5.8			3.2	J
Toluene	410,000,000	<	5.7		<	5.6		<	5.8		<	5.6	
Trichloroethene	520,000	<	5.7		<	5.6		<	5.8			12	
Semivolatile Organics (ug/kg dw):													
Benzo(a)anthracene	7,800	<	400		<	380		<	400		<	360	
Benzo(a)pyrene	780	<	400		<	380		<	400		<	360	
Benzo(b)fluoranthene	7,800	<	400		<	380		<	400		<	360	
Benzo(k)fluoranthene	78,000	<	400		<	380		<	400		<	360	
Bis(2-ethylhexyl)phthalate	410,000	<	400		<	380		<	400		<	360	
Chrysene	780	<	400		<	380		<	400		<	360	
Di-n-butylphthalate	200,000,000	<	400		<	380		<	400		<	360	
Di-n-octylphthalate	41,000,000		32.0	J	<	380		<	400		<	360	
Fluoranthene	82,000,000	<	400		<	380		<	400		<	360	
Naphthalene	82,000,000	<	400		<	380		<	400		<	360	
Phenanthrene	NS	<	400		<	380		<	400		<	360	
Pyrene	61,000,000	<	400		<	380		<	400		<	360	
Metals (mg/kg dw):													
Arsenic	3.8 [2/]		$\boxed{13}$			1.9			3.8			$\boxed{6.0}$	
Barium	140,000		28			21			43			58	
Beryllium	1.3		0.44			0.97			$\boxed{1.4}$			0.52	
Chromium	10,000 [3/]		22			8.6			17			37	
Copper	1,000,000		8.1			7.8			10			12	
Lead	400 [4/]		5.0			7.5			9.7			15	
Mercury	610	<	0.030		<	0.030		<	0.030			0.035	
Nickel	41,000		10			15			28			4.7	
Thallium	NS	<	1.0		<	1.0		<	1.0		<	1.0	
Zinc	610,000		25			14			70			29	
Percent Solids			NA			NA			NA			92 %	

Footnotes on Page 5

177

TABLE 2-1
Summary of Constituents Detected in Background Soil Samples
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	USEPA RBC	950719-FW-00-SL0005 (2-4)	950719-FW-00-SL0005 (4-6)	950719-FW-00-SL0006 (0-2)	950719-FW-00-SL0006 (10-12)	950719-FW-00-SL0006 (20-22)
SAMPLE DATE	Ingestion	07/19/95	07/19/95	07/19/95	07/19/95	07/19/95
MATRIX	Soil	SOIL	SOIL	SOIL	SOIL	SOIL
SL LOG NUMBER	Industrial [1/]	T512142*4	T512142*5	T512142*6	T512142*7	T512142*8
Volatile Organic Compounds (ug/kg dw):						
1,1,2-Trichloroethane	100,000	< 5.2	< 5.8	< 6.1	< 5.7	< 6.1
Methylene chloride (Dichloromethane)	760,000	< 5.2	< 5.8	1.9 J	1.4 J	< 6.1
Tetrachloroethene	110,000	5.2 U	5.8 U	20	< 5.7	< 6.1
Toluene	410,000,000	< 5.2	< 5.8	7.4	< 5.7	< 6.1
Trichloroethene	520,000	2.6 J	8.0	82	< 5.7	6.1 U
Semivolatile Organics (ug/kg dw):						
Benzo(a)anthracene	7,800	< 360	< 350	< 370	< 390	< 370
Benzo(a)pyrene	780	< 360	< 350	< 370	< 390	< 370
Benzo(b)fluoranthene	7,800	< 360	< 350	< 370	< 390	< 370
Benzo(k)fluoranthene	78,000	< 360	< 350	< 370	< 390	< 370
Bis(2-ethylhexyl)phthalate	410,000	< 360	< 350	< 370	< 390	< 370
Chrysene	780	< 360	< 350	< 370	< 390	< 370
Di-n-butylphthalate	200,000,000	72 J	< 350	< 370	< 390	< 370
Di-n-octylphthalate	41,000,000	18 J	< 350	38 J	180 J	76 J
Fluoranthene	82,000,000	< 360	< 350	< 370	< 370	< 370
Naphthalene	82,000,000	< 360	< 350	< 370	< 390	< 370
Phenanthrene	NS	< 360	< 350	< 370	< 390	< 370
Pyrene	61,000,000	< 360	< 350	< 370	< 390	< 370
Metals (mg/kg dw):						
Arsenic	3.8 [2/]	3.1	5.5	7.6	7.9	14
Barium	140,000	28	15	72	45	14
Beryllium	1.3	0.53	< 0.40	0.58	< 0.40	< 0.40
Chromium	10,000 [3/]	32	18	30	36	13
Copper	1,000,000	11	6.1	9.9	10	9.0
Lead	400 [4/]	11	8.0	10	14	11
Mercury	610	< 0.030	< 0.030	0.040	< 0.030	< 0.030
Nickel	41,000	< 4.0	< 4.0	15	7.8	< 4.0
Thallium	NS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	610,000	40	11	45	21	8.6
Percent Solids		92 %	94 %	89 %	86 %	90 %

Footnotes on Page 5

j:\proj\tf320\landdisp\rpt\table\fwbgsl2.xls

ARCADIS GERAGHTY&MILLER

TABLE 2-1
Summary of Constituents Detected in Background Soil Samples
Land Disposal Areas RFI
Sloss Industries Corporation

FOOTNOTES:

NA Not Available.

NS No Standard.

J Positive results has been classified as qualitative during data validation or values are greater than the Method Detection Limit (MDL) but less than the Contract Required Quantitation Limit (CRQL) and Contract Required Detection Limit (CRDL). A B after the J (JB) indicates analyte was in a laboratory blank.

U Classified as nondetected.

1/ Source: USEPA Region III Risk-Based Concentrations (RBC), October 22, 1997

2/ RBC for arsenic as a carcinogen.

3/ RBC for Chromium VI.

4/ Residential RBC.

☐ Concentration Exceeds USEPA Industrial RBC.

TABLE 2-2
Summary of Monitor Well and Piezometer
Construction Details and August 17, 1997 Groundwater Elevations
Land Disposal Areas RFI
Sloss Industries Corporation

Monitor Well/ Piezometer Identification	Previous Identification	SWMU Area	SWMU	Date Completed	Top of Casing (ft amsl)	Surface Elevation (ft amsl)	Monitor Well/ Piezometer Depth (ft bls)	Screen Interval (ft bls)	Depth to Water 8/17/97 (ft btoc)	Water Table Elevation 8/17/97 (ft amsl)
P-01D		FW		7/13/95	523.02	520.57	44.5	34.5 - 44.5	17	506.02
P-01S		FW		7/25/95	522.76	520.26	21	11 - 21	16.6	506.16
P-02		FW		7/18/95	531.53	528.5	35.5	25.5 - 35.5	13.92	517.61
P-03		FW		7/21/95	532.98	530.17	32	22 - 32	10.95	522.03
P-04		FW		7/26/95	532.4	529.48	37.5	27.5 - 37.5	11.52	520.88
P-08		FW		7/11/95	568.46	566.48	33	23 - 33	7.57	560.89
P-09		FW		7/6/95	568.22	565.64	160.5	150.5 - 160.5	162.54	405.68
P-10		FW		7/6/95	569.68	567.8	32.5	22.5 - 32.5	12.5	557.18
P-11		FW		7/8/95	569.95	567.56	27	17 - 27	6.44	563.51
P-12		FW		7/8/95	579.42	576.79	26.5	16.5 - 26.5	6.14	573.28
P-13D		FW		7/15/96	581.37	578.53	169.5	159.5 - 169.5	114.83	466.54
P-13S		FW		7/26/95	581.41	578.48	26	16 - 26	9.68	571.73
P-14		FW		7/13/96	583.37	580.82	75.5	65.5 - 75.5	9.11	574.26
P-15		FW		7/12/95	581.69	582.03	25.5	15.5 - 25.5	5.79	575.9
P-16a		FW		7/10/95	585.18	582.26	21.5	11.5 - 21.5	5.52	579.66
P-17		FW		6/29/95	586.16	583.74	115.5	105.5 - 115.5	5.06	581.1
P-18		FW		6/29/95	594.06	591.91	72.5	62.5 - 72.5	11.05	583.01
P-19D		FW		6/30/95	591.19	589.11	57.5	47.5 - 57.5	4.29	586.9
P-19S		FW		6/27/95	591.41	589.33	27.5	17.5 - 27.5	4.51	586.9
P-20		FW		7/31/95	585.2	582.57	198.3	188.3 - 198.3	82.15	503.05
P-21		FW		6/23/95	575.75	573.59	165.5	155.5 - 165.5	121.41	454.34
P-22		FW		6/17/95	570.82	568.44	48.5	38.5 - 48.5	10.56	560.26
P-23		FW		6/17/95	564.67	562.49	48.5	38.5 - 48.5	17.02	547.65
P-32		FW		8/4/95	579.71	576.89	27	17 - 27	5.62	574.09
MW-05		FW		NA	532.05	529.89	18	8 - 18	NM	NM

TABLE 2-2
Summary of Monitor Well and Piezometer
Construction Details and August 17, 1997 Groundwater Elevations
Land Disposal Areas RFI
Sloss Industries Corporation

Monitor Well/ Piezometer Identification	Previous Identification	SWMU Area	SWMU	Date Completed	Top of Casing (ft amsl)	Surface Elevation (ft amsl)	Monitor Well/ Piezometer Depth (ft bls)	Screen Interval (ft bls)	Depth to Water 8/17/97 (ft btoc)	Water Table Elevation 8/17/97 (ft amsl)
MW-21		LD	23	8/9/97	558.85	556.58	39	29 - 39	15.3	543.55
MW-22	P-31	LD	23	7/20/95	628.86	625.7	118.5	108.5 - 118.5	93.62	535.24
MW-23	P-30	LD	23	7/27/95	635.88	632.94	78.5	68.5 - 78.5	31.98	603.9
MW-24	P-29	LD	23	7/26/95	594.99	591.81	73.3	63.3 - 73.3	12.97	582.02
MW-25D	P-28D	LD	23	7/26/95	559.63	556.87	66.3	56.3 - 66.3	17.17	542.46
MW-25S	P-28S	LD	23	7/20/95	559.67	556.76	45.5	35.5 - 45.5	17.87	541.8
MW-26	P-27	LD	38	6/20/95	549.58	547.41	140.5	130.5 - 140.5	85.48	464.1
MW-27	P-26	LD	38	6/16/95	554.97	552.15	37	27 - 37	16.09	538.88
MW-28	P-25	LD	38	6/15/95	558.32	556.44	58	48 - 58	16.31	542.01
MW-29		LD	38	8/12/97	563.89	561.86	36	26 - 36	20.55	543.34
MW-30D	P-24D	LD	38	6/17/95	564.43	562.26	58.5	48.5 - 58.5	20.67	543.76
MW-30S	P-24S	LD	38	6/20/95	564.68	562.21	34.5	24.5 - 34.5	21.17	543.51
MW-31		LD	39	8/13/97	571.52	569.46	46.5	36.5 - 46.5	20.74	550.78
MW-32	P-07	LD	39	6/21/95	569.43	567.24	47	37 - 47	16.84	552.59
MW-33		LD	39	8/11/97	556.73	554.46	39	29 - 39	8.18	548.55
MW-34D	P-06D	LD	39	6/21/95	546.1	544	178	168 - 178	5.69	540.41
MW-34S	P-06S	LD	39	6/26/95	545.98	543.84	34	24 - 34	6.37	539.61
MW-35		LD	39	8/14/97	542.46	540.12	29.5	19.5 - 29.5	26.33	516.13
MW-36 [1/]	P-05	LD	39	6/23/95	532.43	530.34	136.5	126.5 - 136.5	-2.71	535.14
MW-37		LD	38	8/11/97	537.44	535.36	30	20 - 30	3.84	533.6

ft amsl Feet above mean sea level.
ft bls Feet below land surface.
ft btoc Feet below top of casing.
NM Not Measured
FW Facility-Wide
LD Land Disposal Areas
1/ Flowing Well

181

g:\proj\tl320\landdisp\rpt\table\Pzwlcons.xls
10:52 AM 1/12/98

ARCADIS GERAGHTY & MILLER

TABLE 2-3
Summary of In-Situ Permeability Testing for Facility-Wide and Land Disposal Areas Investigations
Sloss Industries Corporation

Well	K (cm/sec) Slug In	K (cm/sec) Slug Out	i (ft/ft)	n	v (ft/min) Slug In	v (ft/min) Slug Out	v (ft/year) Slug In	v (ft/year) Slug Out
Conasauga Limestone								
P-2	8 E-04	4 E-04	0.025	0.20	2 E-04	1 E-04	100	60
P-3	2 E-03	1 E-03	0.025	0.20	4 E-04	3 E-04	200	200
P-4	1 E-06	4 E-08	0.025	0.01	6 E-06	2 E-07	3	0.1
P-8	3 E-03	4 E-03	0.025	0.20	8 E-04	1 E-03	400	600
P-10	3 E-03	3 E-03	0.025	0.20	7 E-04	7 E-04	400	300
P-11	2 E-04	2 E-04	0.025	0.20	6 E-05	5 E-05	30	20
P-12	4 E-05	8 E-07	0.010	0.01	8 E-05	2 E-06	40	0.9
P-12 DUP	7 E-07	7 E-08	0.010	0.01	1 E-06	1 E-07	0.7	0.07
P-13S	7 E-04	7 E-04	0.010	0.20	7 E-05	7 E-05	40	30
P-14	1 E-04	1 E-04	0.010	0.20	1 E-05	1 E-05	8	7
P-15	4 E-07	5 E-07	0.010	0.01	8 E-07	1 E-06	0.4	0.5
P-16	7 E-04	6 E-04	0.010	0.20	7 E-05	6 E-05	40	30
P-17	4 E-07	7 E-07	0.010	0.01	7 E-07	1 E-06	0.4	0.7
P-18	5 E-04	6 E-04	0.010	0.20	5 E-05	6 E-05	20	30
P-19S	5 E-03	3 E-03	0.010	0.20	5 E-04	3 E-04	300	200
P-19D	6 E-03	7 E-03	0.010	0.20	5 E-04	7 E-04	300	400
P-20	7 E-06	2 E-04	0.010	0.01	1 E-05	4 E-04	8	200
P-22	8 E-04	7 E-04	0.025	0.20	2 E-04	2 E-04	100	90
P-23	8 E-06	4 E-06	0.025	0.01	4 E-05	2 E-05	20	10
P-32	3 E-04	3 E-04	0.025	0.20	9 E-05	7 E-05	40	30
MW-5	1 E-03	9 E-03	0.025	0.20	3 E-04	2 E-03	200	1000
MW-21	2 E-05	3 E-05	0.100	0.20	2 E-05	3 E-05	10	10
MW-25S	2 E-04	1 E-04	0.100	0.20	2 E-04	1 E-04	100	70
MW-25D	1 E-05	6 E-06	0.100	0.20	1 E-05	6 E-06	8	3
MW-27	7 E-03	6 E-03	0.025	0.20	2 E-03	2 E-03	900	800
MW-28	1 E-03	1 E-03	0.025	0.20	3 E-04	3 E-04	100	100
MW-29	7 E-02	7 E-02	0.025	0.20	2 E-02	2 E-02	9000	9000
MW-30S	1 E-02	1 E-02	0.025	0.20	2 E-03	2 E-03	1000	1000
MW-30D	5 E-04	6 E-04	0.025	0.20	1 E-04	1 E-04	60	80
MW-31	2 E-04	1 E-04	0.025	0.20	4 E-05	3 E-05	20	20
MW-32	2 E-04	2 E-04	0.025	0.20	5 E-05	4 E-05	30	20
MW-33	2 E-04	2 E-04	0.025	0.20	5 E-05	5 E-05	30	20
MW-33 DUP	1 E-04	1 E-03	0.025	0.20	3 E-05	3 E-04	20	200
MW-34S	2 E-03	2 E-03	0.025	0.20	4 E-04	4 E-04	200	200
MW-34D	1 E-07	2 E-07	0.025	0.01	5 E-07	1 E-06	0.3	0.6
MW-35	1 E-07	4 E-08	0.025	0.01	5 E-07	2 E-07	0.3	0.1
MW-36	1 E-03	1 E-03	0.025	0.20	3 E-04	4 E-04	200	200
MW-37	2 E-03	2 E-03	0.025	0.20	6 E-04	5 E-04	300	300
Minimum	1 E-07	4 E-08					0.3	0.07
Maximum	7 E-02	7 E-02					9000	9000
Sand Mountain								
P-1S	1 E-03	1 E-03	0.025	0.20	3 E-04	3 E-04	200	100
P-1D	7 E-03	5 E-03	0.025	0.20	2 E-03	1 E-03	900	600
MW-22	3 E-03	2 E-03	0.100	0.20	3 E-03	2 E-03	1000	1000
MW-23	9 E-05	6 E-05	0.100	0.20	9 E-05	6 E-05	50	30
MW-24	5 E-05	2 E-05	0.100	0.20	5 E-05	2 E-05	20	10
Minimum	5 E-05	2 E-05					20	10
Maximum	7 E-03	5 E-03					1000	1000

Footnotes:

cm/sec - Centimeters per second.
ft/ft - Feet per feet.
ft/min - Feet per minute.
ft/year -Feet per year.
K - Hydraulic permeabity.
i - Hydraulic gradient.
n - Porosity (void volume / total volume).
v - Velocity = K i / n.

g:\proj\tf320\landdisp\rpt\table\Ksummary

ARCADIS GERAGHTY&MILLER

TABLE 3-1
Summary of Surficial Soil Samples Collected at SWMU 24 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SWMU	Location	Sample ID	Sample Interval (ft bls)	Date Sampled
SWMU24	24-SL0002	970618-LD-24-SL0002	0-1	6/18/97
	24-SL0003	970617-LD-24-SL0003	0-1	6/17/97
	24-SL0004	970617-LD-24-SL0004	0-1	6/17/97
	24-SL0005	970617-LD-24-SL0005	0-1	6/17/97
	24-SL0006	970617-LD-24-SL0006	0-1	6/17/97
	24-SL0006	970617-LD-24-SL9001	0-1	6/17/97
	24-SL0007	970617-LD-24-SL0007	0-1	6/17/97
	24-SL0008	970618-LD-24-SL0008	0-1	6/18/97
	24-SL0009	970618-LD-24-SL0009	0-1	6/18/97
	24-SL0010	970618-LD-24-SL0010	0-1	6/18/97
	24-SL0011	970618-LD-24-SL0011	0-1	6/18/97
	24-SL0012	970618-LD-24-SL0012	0-1	6/18/97
	24-SL0013	970618-LD-24-SL0013	0-1	6/18/97
	24-SL0014	970618-LD-24-SL0014	0-1	6/18/97
	24-SL0015	970618-LD-24-SL0015	0-1	6/18/97
	24-SL0016	970618-LD-24-SL0016	0-1	6/18/97

Note: Sample 970617-LD-24-SL9001is the duplicate of sample 970617-LD-24-SL0006.
The ground was cleared of sludge before collecting the soil sample.
ft bls - feet below land surface.

TABLE 3-2
Summary of Sludge Samples Collected
at SWMUs 23, 24, and 39 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SWMU	Location	Sample ID	Date Sampled
SWMU 23	23-SM0001	970619-LD-23-SM0001	6/19/97
	23-SM0001	970619-LD-23-SM9001	6/19/97
	23-SM0002	970619-LD-23-SM0002	6/19/97
	23-SM0003	970619-LD-23-SM0003	6/19/97
	23-SM0004	970619-LD-23-SM0004	6/19/97
SWMU 24	24-SM0001	970619-LD-24-SM0001	6/19/97
	24-SM0001	970619-LD-24-SM9001	6/19/97
	24-SM0002	970619-LD-24-SM0002	6/19/97
	24-SM0003	970619-LD-24-SM0003	6/19/97
	24-SM0004	970619-LD-24-SM0004	6/19/97
SWMU 39	39-SM0002	970616-LD-39-SM0002	6/16/97
	39-SM0005	970619-LD-39-SM0005	6/19/97
	39-SM0006	970619-LD-39-SM0006	6/19/97
	39-SM0003	970616-LD-39-SM0003	6/16/97
	39-SM0003	970616-LD-39-SM9001	6/16/97

NOTE: Sample 970619-LD-23-SM9001 is the duplicate of 970619-LD-23-SM0001; sample 970619-LD-24-SM9001 is the duplicate of 970619-LD-24-SM0001; sample 970616-LD-39-SM9001 is the duplicate of 970616-LD-39-SM0003.

TABLE 3-3
Summary of Subsurface Soil Samples
Collected at SWMUs 23, 38 and 39 in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SWMU	Location Name	Sample ID	Sample Interval (ft bls)	Date Sampled	Surface Elevation (ft amsl)	Sample Elevation (ft amsl)	Comments
SWMU 23	*MW-21*	970806-LD-23-SL0021(14-16)	14 - 16	8/6/97	556.58	542.58 - 540.58	
		970806-LD-23-SL0021(20-22)	20 - 22	8/6/97	556.58	536.58 - 534.58	
		970806-LD-23-SL9021(duplicate)	20 - 22	8/6/97	556.58	536.58 - 534.58	
	23-SB*MW22*	970806-LD-23-SL0022(0-2)	0-2	8/6/97	625.7	625.7 - 623.7	Soil boring located 3 ft S of MW-22.
	23-SB*MW23*	970806-LD-23-SL0023(12-14)	12-14	8/6/97	632.94	620.94 - 618.94	Soil boring located 3 ft S of MW-23.
		970806-LD-23-SL0023(24-26)	24-26	8/6/97	632.94	608.94 - 606.94	
	23-SB*MW24*	970805-LD-23-SL0024(7-9)	7-9	8/5/97	591.81	584.81 - 582.81	Soil boring located 5 ft W of MW-24.
		970805-LD-23-SL0024(14-16)	14-16	8/5/97	591.81	577.81 - 575.81	
	23-SB*MW25*	970805-LD-23-SL0025(19-21)	19-21	8/5/97	556.76	537.76 - 535.76	Soil boring located between MW-25S and MW-25D.
SWMU 38	38-SB*MW26*	970804-LD-38-SL0026(10-12)	10-12	8/4/97	547.41	537.41 - 535.41	Soil boring located 3 ft S of MW-26.
		970804-LD-38-SL9026 (duplicate)	10-12	8/4/97	547.41	537.41 - 535.41	
		970804-LD-38-SL0026(18-20)	18-20	8/4/97	547.41	529.41 - 527.41	
	38-SB*MW27*	970805-LD-38-SL0027(11-13)	11-13	8/5/97	552.15	541.15 - 539.15	
		970805-LD-38-SL0027(22-24)	22-24	8/5/97	552.15	530.15 - 528.15	Soil boring located 3 ft SE of MW-27.
		970808-LD-38-SL0027(22-24) [1/]	22-24	8/8/97	552.15	530.15 - 528.15	
	38-SB*MW28*	970807-LD-38-SL0028(8-10)	8-10	8/7/97	556.44	548.44 - 546.44	Soil boring located 5 ft SE of MW-28.
		970807-LD-38-SL0028(13-15)	13-15	8/7/97	556.44	543.44 - 541.44	

TABLE 3-3
Summary of Subsurface Soil Samples
Collected at SWMUs 23, 38 and 39 in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SWMU	Location Name	Sample ID	Sample Interval (ft bls)	Date Sampled	Surface Elevation (ft amsl)	Sample Elevation (ft amsl)	Comments
SWMU 38	*MW-29*	970807-LD-38-SL0029(15-17)	15 - 17	8/7/97	561.86	546.86 - 544.86	
		970807-LD-38-SL0029(19-21)	19 - 21	8/7/97	561.86	542.86 - 540.86	
	38-SB*MW30*	970807-LD-38-SL0030(9-11)	9-11	8/7/97	562.21	553.21 - 551.21	Soil boring located between MW-30S and MW-30D
		970807-LD-38-SL0030(17-19)	17-19	8/7/97	562.21	545.21 - 543.21	
	MW-37	970808-LD-38-SL0037(4-6)	4 - 6	8/8/97	535.36	531.36 - 529.36	
		970808-LD-38-SL0037(8-10)	8 - 10	8/8/97	535.36	527.36 - 525.36	
SWMU 39	*MW-31*						Samples were not collected since soil was not present.
	39-SB*MW32*						Samples were not collected since soil was not present.
	MW-33	970808-LD-39-SL0033(11-13)	11 - 13	8/8/97	554.46	543.46 - 541.46	
	39-SB*MW34*	970805-LD-39-SL0034(10-12)	10-12	8/5/97	543.84	533.84 - 531.84	Soil boring located between MW-34S and MW-34D
		970808-LD-39-SL0034(10-12) [1/]	10-12	8/8/97	543.84	533.84 - 531.84	
	MW-35	970808-LD-39-SL0035(10-12)	10 - 12	8/8/97	540.12	530.12 - 528.12	
	39-SB*MW36*	970804-LD-39-SL0036(5-7)	5-7	8/4/97	530.34	525.34 - 523.34	Soil boring located 5 ft S of MW-36.
		970804-LD-39-SL9036 (duplicate)	5-7	8/4/97	530.34	525.34 - 523.34	
		970804-LD-39-SL0036(10-12)	10-12	8/4/97	530.34	520.34 - 518.34	

186

ft bls - Feet below land surface.
ft amsl - Feet above mean sea level.
[1/] VOC sample was recollected because samples were broken during shipment.

TABLE 3-4
Results of Field Analyses for Groundwater Samples Collected in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

Location	Sample ID	Date Collected	pH (std units)	Temperature (°C)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Appearance
MW-21	970818-LD-23-GW0021	8/18/97	7.30	25	1,320	7.1	28.9	sl turbid
MW-22	970818-LD-23-GW0022	8/18/97	6.86	21	530	2.4	10.10	Clear
MW-23	970818-LD-23-GW0023	8/18/97	5.78	23	170	2.4	27	Sl turbid
MW-24	970818-LD-23-GW0024	8/18/97	5.91	21	290	2.3	>200	Turbid
MW-25D	970819-LD-23-GW0025D	8/19/97	10.42	24	1,000	2.1	>200	Clear
MW-25S	970819-LD-23-GW0025S	8/19/97	7.44	22	780	1.5	2.5	Clear
MW-26	970821-LD-38-GW0026	8/21/97	7.83	20	2,850	1.3	>200	Sheen
MW-27	970819-LD-38-GW0027	8/19/97	6.56	20	840	1.8	1.97	Clear
MW-28	970819-LD-38-GW0028	8/19/97	7.23	23	610	1.9	5.1	Clear
MW-29	970819-LD-38-GW0029	8/19/97	7.34	24	630	1.1	3.6	Clear
MW-30D	970821-LD-38-GW0030D	8/21/97	7.08	21	550	2.1	6.2	Clear
MW-30S	970821-LD-38-GW0030S	8/21/97	6.64	22	510	4.4	10.1	Clear
MW-31	970821-LD-39-GW0031	8/21/97	6.64	23	430	1.9	136.4	Sl turbid
MW-32	970821-LD-39-GW0032	8/21/97	6.63	24	450	3.7	9.2	Clear
MW-33	970820-LD-39-GW0033	8/20/97	6.40	22	1,140	2.8	0.8	Clear
MW-34S	970820-LD-39-GW0034S	8/20/97	6.55	21	1,490	1.3	8.85	Clear
MW-34D	970821-LD-39-GW0034D	8/21/97	8.47	23	1,160	2.2	>200	Sl turbid
MW-35	970821-LD-39-GW0035	8/21/97	7.47	22	1,690	6.0	5.7	Clear
MW-36	970821-LD-39-GW0036	8/21/97	9.16	22	1,010	1.2	2.4	Clear
MW-37	970821-LD-38-GW0037	8/21/97	6.97	26	510	1.5	4.7	Clear

std units	Standard Units
°C	Degrees Centigrade
umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter
NTU	Nephlemetric Turbidity Units

TABLE 4-1
Summary of Site Background Soil Concentration Ranges
and USEPA Risk Based Concentrations
Land Disposal Areas RFI
Sloss Industries Corporation

CHEMICAL	BACKGROUND CONCENTRATION RANGE	USEPA RBC SOIL INGESTION-RESIDENTIAL 1/	USEPA RBC SOIL INGESTION-INDUSTRIAL 1/
Volatile Organic Compounds (ug/kg):			
Acetone	ND	7,800,000	200,000,000
Toluene	1.0-7.4	16,000,000	410,000,000
Semivolatile Organic Compounds (ug/kg):			
* Acenaphthene	ND	4,700,000	120,000,000
* Acenaphthylene	ND	NS	NS
* Anthracene	ND	23,000,000	610,000,000
* Benzo(a)anthracene	33	880	7,800
* Benzo(a)pyrene	40	88	780
* Benzo(b)fluoranthene	65-66	880	7,800
* Benzo(g,h,i)perylene	ND	NS	NS
* Benzo(k)fluoranthene	ND	8,800	78,000
* Chrysene	43	88,000	780,000
* Dibenzo(a,h)anthracene	ND	88	780
* Fluoranthene	58-61	3,100,000	82,000,000
* Fluorene	ND	3,100,000	82,000,000
* Indeno(1,2,3-cd)pyrene	ND	880	7,800
* Phenanthrene	30	NS	NS
* Naphthalene	44-48	3,100,000	82,000,000
* Pyrene	52	2,300,000	61,000,000
Metals (mg/kg):			
Antimony, Total	ND	31	820
Arsenic, Total	1.9-21	0.43 2/	3.8 2/
Barium, Total	14-200	5,500	140,000
Beryllium, Total	0.44-2.6	0.15	1.3
Cadmium, Total	ND	39	1,000
Chromium, Total	8.6-46	390 3/	1,0000 3/
Copper, Total	5.0-32	270,000	1,000,000
Lead, Total	5.0-23	400	NS
Mercury, Total	0.034-0.15	23	610
Nickel, Total	4.7-47	1,600	41,000
Silver, Total	ND	390	10,000
Zinc, Total	8.6-71	23,000	610,000
Cyanide, Total (mg/kg):	ND	1,600	41,000

ND - Not Detected. This constituent was not detected in site background soil samples.
NS - No Standard.
1/ Source: EPA Region III Risk-Based Concentrations (RBCs), October 22, 1997
2/ RBC for arsenic as a carcinogen RBC.
3/ Chromium VI RBC.
* Polycyclic aromatic hydrocarbon (PAH).

TABLE 4-2
Summary of In-Situ Permeability Testing for Land Disposal Area SWMUs
Land Disposal Areas RFI
Sloss Industries Corporation

Well	K (cm/sec) Slug In	K (cm/sec) Slug Out	i (ft/ft)	n	v (ft/min) Slug In	v (ft/min) Slug Out	v (ft/year) Slug In	v (ft/year) Slug Out
SWMU 23								
MW-21	2 E-05	3 E-05	0.100	0.20	2 E-05	3 E-05	10	10
MW-22	3 E-03	2 E-03	0.100	0.20	3 E-03	2 E-03	1000	1000
MW-23	9 E-05	6 E-05	0.100	0.20	9 E-05	6 E-05	50	30
MW-24	5 E-05	2 E-05	0.100	0.20	5 E-05	2 E-05	20	10
MW-25S	2 E-04	1 E-04	0.100	0.20	2 E-04	1 E-04	100	70
MW-25D	1 E-05	6 E-06	0.100	0.20	1 E-05	6 E-06	8	3
Minimum	1 E-05	6 E-06					8	3
Maximum	3 E-03	2 E-03					1000	1000
IN THE VICINITY OF SWMU 24								
P-2	8 E-04	4 E-04	0.025	0.20	2 E-04	1 E-04	100	60
P-3	2 E-03	1 E-03	0.025	0.20	4 E-04	3 E-04	200	200
P-4	1 E-06	4 E-08	0.025	0.01	6 E-06	2 E-07	3	0.1
MW-5	1 E-03	9 E-03	0.025	0.20	3 E-04	2 E-03	200	1000
MW-36	1 E-03	1 E-03	0.025	0.20	3 E-04	4 E-04	200	200
Minimum	1 E-06	4 E-08					3	0.1
Maximum	2 E-03	9 E-03					200	1000
SWMU 38 and 39								
MW-27	7 E-03	6 E-03	0.025	0.20	2 E-03	2 E-03	900	800
MW-28	1 E-03	1 E-03	0.025	0.20	3 E-04	3 E-04	100	100
MW-29	7 E-02	7 E-02	0.025	0.20	2 E-02	2 E-02	9000	9000
MW-30S	1 E-02	1 E-02	0.025	0.20	2 E-03	2 E-03	1000	1000
MW-30D	5 E-04	6 E-04	0.025	0.20	1 E-04	1 E-04	60	80
MW-31	2 E-04	1 E-04	0.025	0.20	4 E-05	3 E-05	20	20
MW-32	2 E-04	2 E-04	0.025	0.20	5 E-05	4 E-05	30	20
MW-33	2 E-04	2 E-04	0.025	0.20	5 E-05	5 E-05	30	20
MW-33 DUP	1 E-04	1 E-03	0.025	0.20	3 E-05	3 E-04	20	200
MW-34S	2 E-03	2 E-03	0.025	0.20	4 E-04	4 E-04	200	200
MW-34D	1 E-07	2 E-07	0.025	0.01	5 E-07	1 E-06	0.3	0.6
MW-35	1 E-07	4 E-08	0.025	0.01	5 E-07	2 E-07	0.3	0.1
MW-36	1 E-03	1 E-03	0.025	0.20	3 E-04	4 E-04	200	200
MW-37	2 E-03	2 E-03	0.025	0.20	6 E-04	5 E-04	300	300
Minimum	1 E-07	4 E-08					0.3	0.1
Maximum	7 E-02	7 E-02					9000	9000

Footnotes:

cm/sec - Centimeters per second.
ft/ft - Feet per feet.
ft/min - Feet per minute.
ft/year -Feet per year.
K - Hydraulic permeabity.
i - Hydraulic gradient.
n - Porosity (void volume / total volume).
v - Velocity = K i / n.

TABLE 4-3
Summary of Total Constituents Detected in Sludge
Samples Collected at SWMU 23 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	970619-LD-23 SM0001	970619-LD-23-SM9001	970619-LD-23-SM0002	970619-LD-23-SM0003	970619-LD-23 SM0004
LAB ID	84273-11	84273-17	84273-14	84273-15	84273-16
SAMPLE DATE	6/19/97	6/19/97	6/19/97	6/19/97	6/19/97
Volatile Organic Compounds (ug/kg):					
2-Butanone (MEK)	530	<1500	<2300	250	<1500
Acetone	1200	<1500	<2300	670	<1500
Ethylbenzene	<28	<150	<230	<24	220
Toluene	<28	<150	5100	200	520
Xylenes	96	<150	650	<24	900
Semivolatile Organic Compounds (ug/kg):					
Acenaphthylene	2000	4200	11000	8100	2700
Anthracene	<1800	<1900	3800	<1600	<1900
Benzo(a)anthracene	7800	15000	27000	45000	5300
Benzo(a)pyrene	7200	12000	31000	47000	6500
Benzo(b)fluoranthene	6100	11000	30000	57000	3800
Benzo(g,h,i)perylene	7200	8200	24000	40000	5000
Benzo(k)fluoranthene	6100	5000	21000	27000	5300
Chrysene	6100	10000	16000	39000	3700
Dibenzo(a,h)anthracene	<1800	<1900	3200	<1600	<1900
Fluoranthene	7200	10000	25000	24000	5700
Fluorene	<1800	<1900	5400	<1600	<1900
Indeno(1,2,3-cd)pyrene	6700	8200	21000	39000	5500
Naphthalene	<1800	<1900	<3000	<1600	4100
Phenanthrene	2600	3500	14000	<1600	4400
Pyrene	7200	14000	19000	31000	3600
4-methylphenol (p-cresol)	2700	2800	<3000	3000	10000
Total PAHs	66200	101100	251400	357100	55600

190

g:/proj/tf320/landdisp/rpt/table/23smsum2.xls
11:03 AM 1/12/98

ARCADIS GERAGHTY&MILLER

TABLE 4-3
Summary of Total Constituents Detected in Sludge
Samples Collected at SWMU 23 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	970619-LD-23 SM0001	970619-LD-23-SM9001	970619-LD-23-SM0002	970619-LD-23-SM0003	970619-LD-23 SM0004
LAB ID	84273-11	84273-17	84273-14	84273-15	84273-16
SAMPLE DATE	6/19/97	6/19/97	6/19/97	6/19/97	6/19/97
Metals (mg/kg):					
Arsenic, Total	11 J	6.3 J	11.5 J	42 J	<6 UJ
Barium, Total	160	130	450	390	250
Chromium, Total	65	64	130	190	130
Copper, Total	32	31	110	240	87
Lead, Total	18	18	51	50	35
Mercury, Total	<1.396	1.9	8.6	7.7	7.2
Nickel, Total	68	68	140	270	200
Selenium, Total	45	50	150	117	62
Silver, Total	<5.6	<5.7	8	5.7	<6
Zinc, Total	140 J	120 J	300 J	280 J	220 J
Cyanide, Total (mg/kg)	20.3 J	16.1 J	<1.8 R	136 J	4 J
Percent Solids (%)	18	18	12	21	17

NOTE: Sludge sample 970619-LD-23-SM9001 is the duplicate of 970619-LD-23-SM0001.
J - Positive results have been classified as qualitative during data validation.
UJ - Analyte was not detected at or above the indicated concentration and has been classified as qualitative.
R - Data classified as unusable.
ug/kg - Micrograms per kilogram.
mg/kg - Milligrams per kilogram.

TABLE 4-4
Summary of TCLP Constituents Detected in Sludge
Samples Collected at SWMU 23 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	RCRA TC Level	970619-LD-23-SM0001	970619-LD-23-SM9001	970619-LD-23-SM0002	970619-LD-23-SM0003	970619-LD-23 SM0004
LAB ID		84273-11	84273-17	84273-14	84273-15	84273-16
SAMPLE DATE		6/19/97	6/19/97	6/19/97	6/19/97	6/19/97
TCLP-Volatile Organic Compounds (mg/L):		ND	NA	ND	ND	ND
TCLP-Semivolatile Organic Compounds (mg/L):		ND	NA	ND	ND	ND
TCLP-Organochlorine Pesticides (mg/L):		ND	NA	ND	ND	ND
TCLP-Chlorinated Herbicides (mg/L):		ND	NA	ND	ND	ND
TCLP-Metals (mg/L):						
Barium	100	12	NA	18	7.6	3.5
Chromium	5	<0.03	NA	0.18	<0.01	0.12

NA Not Analyzed.
ND Not detected. Analytes in this group were all below their respective detection limits.
mg/L Milligrams per liter.

TABLE 4-5
Summary of Constituents Detected in Subsurface
Soil Samples Collected at SWMU 23 in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	USEPA RBC	970806-LD-23-SL0021(14-16)	970806-LD-23-SL0021(20-22)	970806-LD-23-SL9021	970806-LD-23-SL0022(0-2)	970806-LD-23-SL0023(12-14)
LAB ID	Soil Ingestion-	85785-6	85785-5	85785-7	85785-2	85785-3
SAMPLE DATE	Industrial [1/]	8/6/97	8/6/97	8/6/97	8/6/97	8/6/97
Volatile Organic Compounds (ug/kg):						
Acetone	200,000,000	<72	<75	<77	<57	<60
Semivolatile Organic Compounds (ug/kg):		ND	ND	ND	ND	ND
Metals (mg/kg):						
Arsenic, Total	3.8 [2/]	3.6 J	2.2 J	2 J	$\boxed{4.6}$	2.9
Barium, Total	140,000	39 J	82	63 J	25	14
Beryllium, Total	1.3	<0.7 UJ	<0.7	<0.8 UJ	<0.6	<0.6
Cadmium, Total	1,000	<0.7 UJ	<0.7 UJ	<0.8 UJ	<0.6 UJ	<0.6 UJ
Chromium, Total	10,000 [3/]	<1.4 UJ	9.3	15 UJ	11	<1.2
Copper, Total	1,000,000	<2.9 UJ	<3	<3.1 UJ	<2.3	<2.4
Lead, Total	400 [4/]	<3.6	<3.7	<3.9	13	<3
Nickel, Total	41,000	<2.9 UJ	28	23 UJ	<2.3	<2.4
Zinc, Total	610,000	41	63	54	41	32
Cyanide, Total (mg/kg):	41000	0.43	0.34	0.46	<0.2	0.31
Percent Solids (%)	NS	69	67	65	88	84

Footnotes on Page 2

193

TABLE 4-5
Summary of Constituents Detected in Subsurface Soil Samples Collected at SWMU 23 in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	USEPA RBC	970806-LD-23-SL0023(24-26)	970805-LD-23-SL0024(7-9)	970805-LD-23-SL0024(14-16)	970805-LD-23-SL0025(19-21)
LAB ID	Soil Ingestion-	85785-4	85657-17	85657-19	85657-16
SAMPLE DATE	Industrial 1/	8/6/97	8/5/97	8/5/97	8/5/97
Volatile Organic Compounds (ug/kg):					
Acetone	200,000,000	<61	<61	<72	110
Semivolatile Organic Compounds (ug/kg):		ND	ND	ND	ND
Metals (mg/kg):					
Arsenic, Total	3.8 2/	$\boxed{6.3}$	$\boxed{13}$	$\boxed{30}$	3.8
Barium, Total	140,000	76	43	53	180
Beryllium, Total	1.3	<0.6	<0.6	0.7	<0.6
Cadmium, Total	1,000	<0.6 UJ	2.5	2.4	<0.6
Chromium, Total	10,000 3/	<1.2	7	19	15
Copper, Total	1,000,000	<2.5	5	22	<2.5
Lead, Total	400 4/	10	4.4	19	<3.2
Nickel, Total	41,000	8.8	45	66	18
Zinc, Total	610,000	70	83	430	47
Cyanide, Total (mg/kg):	41000	<0.3	<0.3	<0.3	<0.3
Percent Solids (%)	NS	82	82	70	78

NOTE: Sample 970806-LD-23-SL9021 is the duplicate of 970806-LD-23-SL0021 (20-22)

Explanation:

J	Positive results have been classified as qualitative during data validation.
UJ	Analyte was not detected at or above the indicated concentration and has been classified as qualitative.
ND	Not detected. Analytes in this group were all below their respective detection limits.
ug/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
$\boxed{}$	Concentration exceeds Industrial RBC
1/	Source: USEPA Region III Risk Based Concentrations (RBC), October 22, 1997.
2/	RBC for Arsenic as a carcinogen.
3/	RBC for Chromium VI.
4/	Residential RBC.

194

ARCADIS GERAGHTY & MILLER

TABLE 4-6
Summary of Constituents Detected in Groundwater
Samples Collected at SWMU 23 in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	USEPA MCL	970818-LD-23-GW0021	970818-LD-23-GW0022	970818-LD-23-GW0023	970818-LD-23-GW0024	970819-LD-23-GW0025D	970819-LD-23 GW9025D	970819-LD-23-GW0025S
LAB ID		86126-2	86126-1	86126-3	86126-4	86126-7	86126-12	86126-11
SAMPLE DATE		35660	35660	35660	35660	35661	35661	35661
Volatile Organic Compounds(ug/L)								
Acetone	3,700 [1/]	<50	110	<50	<50	<50	<50	<50
Semivolatile Organic Compounds(ug/L)		ND	ND	ND	ND	ND	ND	ND
Metals (mg/L):								
Barium, Total	2	0.14	0.05	0.09	0.07	0.28	0.29	0.1
Chromium, Total	0.1	0.02	<0.01	0.01	0.01	0.03	0.03	<0.01
Copper, Total	1.3	<0.02	<0.02	<0.02	<0.02	0.02	0.02	0.02
Nickel, Total	0.1	0.02	<0.02	<0.02	0.02	0.04	0.04	<0.02
Zinc, Total	5	<0.02	0.05	0.11	0.09	0.09	0.11	0.06
Cyanide, Total (mg/L):	0.2	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

ND = Not Detected

[1/] USEPA Region III Risk Based Concentration (RBC) for tap water, October 22, 1997

195

TABLE 4-7
Summary of Total Constituents Detected in Sludge
Samples Collected at SWMU 24 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	970619-LD-24-SM0001	970619-LD-24-SM9001	970619-LD-24-SM0002	970619-LD-24-SM0003	970619-LD-24-SM0004
LAB ID	84273-6	84273-10	84273-7	84273-8	84273-9
SAMPLE DATE	6/19/97	6/19/97	6/19/97	6/19/97	6/19/97
Volatile Organic Compounds (ug/kg):	ND	ND	ND	ND	ND
Semivolatie Organic Compounds (ug/kg):	ND	ND	ND	ND	ND
Metals (mg/kg):					
Antimony, Total	17	17	18	18	15
Arsenic, Total	18 J	17 J	15 J	15 J	15 J
Barium, Total	200	190	240	240	220
Beryllium, Total	2.4	2.6	2.4	3.1	2.6
Cadmium, Total	8.7	9	7.9	8.2	11
Chromium, Total	120	110	180	160	50
Copper, Total	110	110	85	87	130
Lead, Total	310	330	240	1703	530
Nickel, Total	36	36	43	42	33
Silver, Total	4.3	4.8	2.9	2.8	6.1
Zinc, Total	3100 J	3000 J	2900 J	2300 J	4500 J
Cyanide, Total (mg/kg):	3.8 J	3.1 J	3.2 J	2.4 J	4.7 J
Percent Solids (%)	83	84	85	86	82

J - Positive results have been classified as qualitative during data validation.
ND - Not detected. Analytes in this group were all below their respective detection limits.
ug/kg - Micrograms per kilogram.
mg/kg - Milligrams per kilogram.
NOTE: Sludge sample 970619-LD-24-SM9001 is the duplicate of 970619-LD-24-SM0001

TABLE 4-8
Summary of TCLP Constituents Detected in Sludge
Samples Collected at SWMU 24 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	RCRA TC Level	970619-LD-24-SM0001	970619-LD-24-SM9001	970619-LD-24-SM0002	970619-LD-24-SM0003	970619-LD-24-SM0004
LAB ID		84273-6	84273-10	84273-7	84273-8	84273-9
SAMPLE DATE		6/19/97	6/19/97	6/19/97	6/19/97	6/19/97
TCLP-Volatile Organic Compounds (mg/L):		ND	ND	ND	ND	ND
TCLP-Semivolatie Organic Compounds (mg/L):		ND	ND	ND	ND	ND
TCLP-Organochlorine Pesticides (mg/L):		ND	ND	ND	ND	ND
TCLP-Chlorinated Herbicides (mg/L):		ND	ND	ND	ND	ND
TCLP-Metals (mg/L):						
Barium	100	1	0.9	0.8	0.6	1.2
Cadmium	1	0.03	0.03	0.01	<0.01	0.06

NOTE: Sludge sample 970619-LD-24-SM9001 is the duplicate of 970619-LD-24-SM0001.
ND - Not detected. Analytes in this group were all below their respective detection limits.
mg/L - Milligrams per liter.

TABLE 4-9
Summary of Consituents Detected in Surficial
Soil Samples Collected at SWMU 24 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID LAB ID SAMPLE DATE	USEPA RBC Soil Ingestion- Industrial 1/	970618-LD-24-SL0002 84221-12 6/18/97	970617-LD-24-SL0003 84221-13 6/17/97	970617-LD-24-SL0004 84221-14 6/17/97	970617-LD-24-SL0005 84221-15 6/17/97	970617-LD-24-SL0006 84221-16 6/17/97	970617-LD-24-SL9001 84221-11 6/17/97	970617-LD-24-SL0007 84221-19 6/17/97	970618-LD-24-SL0008 84221-20 6/18/97
Volatile Organic Comounds (ug/kg):									
Acetone	200,000,000	<70	<57	<68	<65	<60	<61	<93	<66
Semivolatile Organic Compounds (ug/kg):									
Acenaphthene	120,000,000	<460	<380	<450	<430	<400	<400	<610	<430
Acenaphthylene	NS	<460	580	<450	<430	<400	<400	780	<430
Anthracene	610,000,000	<460	410	<450	<430	<400	<400	<610	<430
Benzo(a)anthracene	7,800	<460	2050	<450	640	<400	<400	590	<430
Benzo(a)pyrene	780	<460	1400	<450	480	<400	<400	700	<430
Benzo(b)fluoranthene	7,800	<460	1500	<450	<430	<400	<400	980	<430
Benzo(g,h,i)perylene	NS	<460	1500	<450	<430	<400	<400	1600	<430
Benzo(k)fluoranthene	78,000	<460	980	<450	500	<400	<400	780	<430
Chrysene	780,000	<460	1400	<450	470	<400	<400	<610	<430
Dibenzo(a,h)anthracene	780	<460	<380	<450	<430	<400	<400	<610	<430
Fluoranthene	82,000,000	<460	2200	<450	690	<400	<400	<610	<430
Fluorene	82,000,000	<460	<380	<450	<430	<400	<400	<610	<430
Indeno(1,2,3-cd)pyrene	7,800	<460	1300	<450	<430	<400	<400	1500	<430
Naphthalene	82,000,000	<460	<380	<450	<430	<400	<400	<610	<430
Phenanthrene	NS	<460	1200	<450	<430	<400	<400	<610	<430
Pyrene	61,000,000	<460	1600	<450	460	<400	<400	<610	<430

Footnotes on Page 4

198

TABLE 4-9
Summary of Consituents Detected in Surficial
Soil Samples Collected at SWMU 24 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID LAB ID SAMPLE DATE	USEPA RBC Soil Ingestion-Industrial 1/	970618-LD-24-SL0002 84221-12 6/18/97	970617-LD-24-SL0003 84221-13 6/17/97	970617-LD-24-SL0004 84221-14 6/17/97	970617-LD-24-SL0005 84221-15 6/17/97	970617-LD-24-SL0006 84221-16 6/17/97	970617-LD-24-SL9001 84221-11 6/17/97	970617-LD-24-SL0007 84221-19 6/17/97	970618-LD-24-SL0008 84221-20 6/18/97
Metals (mg/kg):									
Antimony, Total	820	<7 UJ	<5.8 UJ	<6.7 UJ	13 J	<6 UJ	<6.1 UJ	<9.4 UJ	<6.6 UJ
Arsenic, Total	3.8 2/	5.5 J	9.1 J	9.9 J	12.8 J	8.1 J	7.5 J	21 J	9 J
Barium, Total	140,000	34	43	44	180	23	36	93	46
Beryllium, Total	1.3	<0.7	<0.58	<0.67	2.1	<0.6	<0.61	<0.94	<0.66
Cadmium, Total	1,000	<0.7	0.83	<0.67	10	<0.6	<0.61	2	1.2
Chromium, Total	10,000 3/	20	11	22	120	17	18	25	10
Copper, Total	1,000,000	14	13	19	92	10	4.4	29	21
Lead, Total	400 4/	<3.5	20	36	300	19	19	76	49
Mercury, Total	610	<0.35	<0.29	<0.34	<0.32	<0.3	<0.3	0.51	<0.33
Nickel, Total	41,000	6.3	5.9	8.3	39	4.6	5	24	12
Silver, Total	10,000	<1.4	<1.2	<1.3	2.9	<1.2	<1.2	<1.9	<1.3
Zinc, Total	610,000	25	84	240	2200	110	97	610	460
Cyanide, Total (mg/kg)	41,000	<0.3	1.3 J	2.2	4.1 J	0.9 J	0.7 J	2.8 J	0.8 J
Percent Solids (%)	NS	71	87	75	78	84	83	55	76

Footnotes on Page 4

g:/proj/tf320/landdisp/rpt/table/24slsum.xls
11:08 AM 1/12/98

ARCADIS GERAGHTY&MILLER

TABLE 4-9
Summary of Consituents Detected in Surficial
Soil Samples Collected at SWMU 24 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID LAB ID SAMPLE DATE	USEPA RBC Soil Ingestion-Industrial 1/	970618-LD-24-SL0009 84221-21 6/18/97	970618-LD-24-SL0010 84221-22 6/18/97	970618-LD-24-SL0011 84221-23 6/18/97	970618-LD-24-SL0012 84221-24 6/18/97	970618-LD-24-SL0013 84221-25 6/18/97	970618-LD-24-SL0014 84221-26 6/18/97	970618-LD-24-SL0015 84221-27 6/18/97	970618-LD-24-SL0016 84221-28 6/18/97
Volatile Organic Comounds (ug/kg):									
Acetone	200,000,000	<68	<68	<63	150	<68	<75	<62	<68
Semivolatile Organic Compounds (ug/kg):									
Acenaphthene	120,000,000	<440	<450	<420	<410	<450	<4900	<410	460
Acenaphthylene	NS	<440	<450	568	<410	<450	9400	<410	1400
Anthracene	610,000,000	<440	<450	730	<410	<450	10000	<410	1000
Benzo(a)anthracene	7,800	<440	<450	3500	760	<450	63000	790	5900
Benzo(a)pyrene	780	<440	<450	2100	660	<450	36000	430	3400
Benzo(b)fluoranthene	7,800	<440	<450	2000	540	<450	33000	<410	3600
Benzo(g,h,i)perylene	NS	<440	<450	2000	720	<450	22000	<410	3900
Benzo(k)fluoranthene	78,000	<440	<450	1800	660	<450	16000	<410	1500
Chrysene	780,000	<440	<450	2100	560	<450	39000	530	3200
Dibenzo(a,h)anthracene	780	<440	<450	<420	<410	<450	<4900	<410	570
Fluoranthene	82,000,000	<440	<450	3200	860	<450	46000	1100	3500
Fluorene	82,000,000	<440	<450	490	<410	<450	<4900	<410	1200
Indeno(1,2,3-cd)pyrene	7,800	<440	<450	1800	650	<450	22000	<410	3600
Naphthalene	82,000,000	<440	<450	490	<410	<450	6300	<410	680
Phenanthrene	NS	<440	<450	1700	<410	<450	14000	500	2600
Pyrene	61,000,000	<440	<450	3100	590	<450	55000	790	5200

Footnotes on Page 4

g:/proj/tf320/landdisp/rpt/table/24slsum.xls
11:08 AM 1/12/98

ARCADIS GERAGHTY&MILLER

TABLE 4-9
Summary of Consituents Detected in Surficial
Soil Samples Collected at SWMU 24 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID / LAB ID / SAMPLE DATE	USEPA RBC Soil Ingestion- Industrial 1/	970618-LD-24-SL0009 84221-21 6/18/97	970618-LD-24-SL0010 84221-22 6/18/97	970618-LD-24-SL0011 84221-23 6/18/97	970618-LD-24-SL0012 84221-24 6/18/97	970618-LD-24-SL0013 84221-25 6/18/97	970618-LD-24-SL0014 84221-26 6/18/97	970618-LD-24-SL0015 84221-27 6/18/97	970618-LD-24-SL0016 84221-28 6/18/97
Metals (mg/kg):									
Antimony, Total	820	<6.7 UJ	<6.8 UJ	<6.3 UJ	<6.2 UJ	<6.8 UJ	<7.5 UJ	<6.2 UJ	7.4 J
Arsenic, Total	3.8 2/	9.1 J	16.4 J	9.9 J	13.5 J	7.1 J	19 J	7.7 J	13.7 J
Barium, Total	140,000	28	100	160	99	81	140	65	190
Beryllium, Total	1.3	<0.67	<0.68	1.4	1.2	1.2	<0.7	<0.62	1.7
Cadmium, Total	1,000	<0.67	2.3	2	1.3	<0.68	4.2	<0.62	7.3
Chromium, Total	10,000 3/	8.1	162	25	15	11	22	12	47
Copper, Total	1,000,000	12	41	39	30	15	68	14	79
Lead, Total	400 4/	13	120	97	56	13	190	21	260
Mercury, Total	610	<0.36	0.35	<0.32	<0.31	<0.34	0.52	<0.31	0.63
Nickel, Total	41,000	15	23	17	45	18	26	12	30
Silver, Total	10,000	<1.3	1.6	<1.3	<1.2	<1.4	2	<1.2	3.2
Zinc, Total	610,000	120	780	740	470	68	1500	160	1900
Cyanide, Total (mg/kg)	41,000	0.8 J	1.7 J	0.7	1	1.2	4.3	5.6	2
Percent Solids (%)	NS	75	74	79	82	73	67	81	75

J = Positive results have been classified as qualitative during data validation.
UJ = Analyte was not detected at or above the indicated concentration and has been classified as qualitative.
1/ Source: USEPA Region III Risk-Based Conhcentrations (RBC), October 22, 1997.
2/ RBC for Arsenic as a carcinogen.
3/ RBC for Chromium VI.
4/ Residential RBC.
[ ] Concentration exceeds Industrial RBC.

201

TABLE 4-10
Summary of Total Constituents Detected in Sludge
Samples Collected at SWMU 39 in June 1997
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE ID	970616-LD-39-SM0002	970616-LD-39-SM0003	970616-LD-39-SM9001	970619-LD-39-SM0005	970619-LD-39-SM0006
LAB ID	84221-5	84221-6	84221-3	84273-4	84273-5
SAMPLE DATE	6/16/97	6/16/97	6/16/97	6/19/97	6/19/97
Volatile Organic Compounds (ug/kg):	ND	ND	ND	ND	ND
Semivolatile Organic Compounds (ug/kg):					
Benzo(k)fluoranthene	<400	<380	<370	<410	630
Metals (mg/kg):					
Antimony, Total	12 J	13	12 J	15	11
Arsenic, Total	7.6 J	7 J	7.6 J	8.8 J	3.8 J
Barium, Total	260	230	220	200	85
Beryllium, Total	1.6	2.1	2.3	<0.6	<0.6
Cadmium, Total	11	8.3	12	6.5	5
Copper, Total	160	110	120	<2.5	7.2
Lead, Total	320	220	220	30	320
Nickel, Total	25	20	20	12	9.6
Silver, Total	4.6	3.4	3	<1.2	<1.3
Zinc, Total	3100	2900 J	2800	600 J	1400 J
Cyanide, Total (mg/kg):	3.2 J	4.7 J	4.8 J	8.3 J	<0.2 R
Percent Solids (%)	84	89	90	82	79

NOTE: Sample 970616-LD-39-SM9001 is the duplicate of 970616-LD-39-SM0003.
J - Positive results have been classified as qualitative during data validation.
R - Data classified as unusable.
ND - Not detected. Analytes in this group were all below their respective detection limits.
ug/kg - Micrograms per kilogram.
mg/kg - Milligrams per kilogram.

TABLE 4-11
Summary of TCLP Constituents Detected in Sludge
Samples Collected at SWMU 39 in June 1997
Land Disposal Areas
Sloss Industries Corporation

SAMPLE ID	RCRA TC Level	970616-LD-39-SM0002	970616-LD-39-SM0003	970616-LD-39-SM9001	970619-LD-39-SM0005	970619-LD-39-SM0006
LAB ID		84221-5	84221-6	84221-3	84273-4	84273-5
SAMPLE DATE		6/16/97	6/16/97	6/16/97	6/19/97	6/19/97
TCLP-Volatile Organic Compounds (mg/L):		ND	ND	NA	ND	ND
TCLP-Semivolatie Organic Compounds (mg/L):		ND	ND	NA	ND	ND
TCLP-Organochlorine Pesticides (mg/L):		ND	ND	NA	ND	ND
TCLP-Chlorinated Herbicides (mg/L):		ND	ND	NA	ND	ND
TCLP-Metals(mg/L):						
Barium	100	2.8	0.91	NA	1.3	<0.3
Cadmium	1	0.036	<0.023	NA	<0.01	<0.01

ND - Not detected. Analytes in this group were all below their respective detection limits.
mg/L - Milligrams per liter.
NA - Not analyzed.

203

TABLE 4-12
Summary of Constituents Detected in Subsurface Soil Samples
Collected at SWMUs 38 and 39 in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

		SWMU 38						
SAMPLE ID	USEPA RBC Soil Ingestion-	970804-LD-38-SL0026(10-12)	970804-LD-38-SL9026	970804-LD-38-SL0026(18-20)	970805-LD-38-SL0027(11-13)	970805-LD-38-SL0027(22-24)	970808-LD-38-SL0027(22-24)	970807-LD-38-SL0028(8-10)
LAB ID	Industrial1/	85657-5	85657-8	85657-6	85657-13	85657-14	85785-18	85785-12
SAMPLE DATE		8/4/97	8/4/97	8/4/97	8/5/97	8/5/97	8/8/97	8/7/97
Volatile Organic Compounds (ug/kg):								
Toluene	410000000	<7	8	<6	<6	NA	<7	<7
Semivolatile Organic Comounds (ug/kg):		ND	ND	ND	ND	ND	NA	ND
Metals (mg/kg):								
Antimony, Total	820	<6.7	<6.7	<5.9	<6.1	<7.6	NA	9.6
Arsenic, Total	3.8 2/	3.3 J	3.5 J	1.8 J	$\boxed{4.1}$	2.3	NA	<1.3
Barium, Total	140,000	110	110	99	8.6	17	NA	19
Beryllium, Total	1.3	$\boxed{1.9}$	$\boxed{1.6}$	<0.6	<0.6	<0.8	NA	<0.6
Chromium, Total	10,000 3/	9.3	8.5	15	15	2.4	NA	15
Copper, Total	1,000,000	6.5	15	6.5	<2.4	<3	NA	6.1
Lead, Total	400 4/	6.4	5.5	<3	<3	<3.8	NA	7.9
Nickel, Total	41,000	32	29	20	<2.4	4.4	NA	<2.7
Silver, Total	10,000	<1.3 UJ	<1.3 UJ	<1.2 UJ	<1.2 UJ	<1.5 UJ	NA	<1.3 UJ
Zinc, Total	610,000	76	51	60	23	18	NA	31
Cyanide, Total (mg/kg):	41,000	<0.3	<0.3	<0.2	<0.2	<0.3	NA	<0.3
Percent Solids (%)	NS	76	76	87	83	66	72	75

Footnotes on Page 3

204

TABLE 4-12
Summary of Constituents Detected in Subsurface Soil Samples
Collected at SWMUs 38 and 39 in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

		SWMU 38						
SAMPLE ID	USEPA RBC Soil Ingestion-	970807-LD-38-SL0028(13-15)	970807-LD-38-SL0029(15-17)	970807-LD-38-SL0029(19-21)	970807-LD-38-SL0030(9-11)	970807-LD-38-SL0030(17-19)	970808-LD-38-SL0037(4-6)	970808-LD-38-SL0037(8-10)
LAB ID	Industrial[1/]	85785-14	85785-10	85785-11	85785-8	85785-9	85785-21	85785-20
SAMPLE DATE		8/7/97	8/7/97	8/7/97	8/7/97	8/7/97	8/8/97	8/8/97
Volatile Organic Compounds (ug/kg):								
Toluene	410000000	<7	<7	<7	<6	<7	<7	<7
Semivolatile Organic Comounds (ug/kg):		ND	ND	ND	ND	ND	ND	ND
Metals (mg/kg):								
Antimony, Total	820	<6.8	<6.7	<6.7	<5.9	<6.7	<6.7	<6.7
Arsenic, Total	3.8[2/]	1.8	<1.3	2.1	4.3 J	5.1 J	2	3.5
Barium, Total	140,000	120	70	130	61	130	2.4	94
Beryllium, Total	1.3	<0.7	<0.7	2.8	<0.6 UJ	<0.8 UJ	<0.7	<0.7
Chromium, Total	10,000[3/]	10	6	3.1	9.4	11	19	5.7
Copper, Total	1,000,000	<2.7	5.2	5.5	<2.3 UJ	110 J	<2.7	<2.7
Lead, Total	400[4/]	36	5	<3.4	<2.9	<3.3	9.4	11
Nickel, Total	41,000	23	5.4	24	<2.3	<2.7	<2.7	3
Silver, Total	10,000	<1.4 UJ	<1.3 UJ	<1.3 UJ	<1.2	7.6	<1.3 UJ	<1.3 UJ
Zinc, Total	610,000	62	47	79	54	190	10	63
Cyanide, Total (mg/kg):	41,000	<0.3	<0.3	<0.3	<0.2	<0.3	<0.3	<0.3
Percent Solids (%)	NS	74	75	75	86	75	75	75

Footnotes on Page 3

TABLE 4-12
Summary of Constituents Detected in Subsurface Soil Samples
Collected at SWMUs 38 and 39 in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

		SWMU 39						
SAMPLE ID	USEPA RBC Soil Ingestion-	970808-LD-39-SL0033(11-13)	970805-LD-39-SL0034(10-12)	970808-LD-39-SL0034(10-12)	970808-LD-39-SL0035(10-12)	970804-LD-39-SL0036(5-7)	970804-LD-39-SL9036	970804-LD-39-SL0036(10-12)
LAB ID	Industrial[1/]	85785-23	85657-15	85785-19	85785-22	85657-2	85657-7	85657-4
SAMPLE DATE		8/8/97	8/5/97	8/8/97	8/8/97	8/4/97	8/4/97	8/4/97
Volatile Organic Compounds (ug/kg):								
Toluene	410000000	<6	NA	<6	<7	<6	<6	<7
Semivolatile Organic Comounds (ug/kg):		ND	ND	ND	ND	ND	ND	ND
Metals (mg/kg):								
Antimony, Total	820	<6.2	<6	NA	<7.5	<6	<6.1	<7.3
Arsenic, Total	3.8[2/]	5	5.2	NA	2.7	4.2	3.5 J	4.8
Barium, Total	140,000	420	180	NA	130	140	140	110
Beryllium, Total	1.3	<0.6	<0.6	NA	<0.7	<0.6	<0.6	<0.7
Chromium, Total	10,000[3/]	10	13	NA	11	8.9	7.9	11
Copper, Total	1,000,000	4.3	<2.4	NA	<3	16	21	9.3
Lead, Total	400[4/]	9.3	10	NA	7.9	28	16	6
Nickel, Total	41,000	22	6	NA	9.3	7.1	7.2	11
Silver, Total	10,000	<1.2 UJ	<1.2 UJ	NA	<1.5 UJ	<2.1 UJ	<1.2 UJ	<1.5 UJ
Zinc, Total	610,000	53	46	NA	57	58	57	96
Cyanide, Total (mg/kg):	41,000	1.25	0.7	NA	<0.3	<0.2	<0.2	<0.3
Percent Solids (%)	NS	82	83	84	67	84	83	69

NA Not Analyzed NS No Standard
ND Not detected. Analytes in this group were all below their respective detection limits.
J Positive results have been classified as qualitative during data validation.
U Classified as nondetected.
ug/kg Micrograms per kilogram.
mg/kg Milligrams per kilogram.

[1/] Source: USEPA Region III Risk Based Concentrations (RBC), October 22, 1997
[2/] RBC for Arsenic as a carcinogen.
[3/] RBC for chromium VI
[4/] Residential RBC

Concentration exceeds Industrial RBC.

Note: Sample 970804-LD-38-SL9025 is the duplicate of 970804-LD-38-SL0025(10-12);
Sample 970804-LD-39-SL9036 is the duplicate of 970804-LD-39-SL0036(5-7).

TABLE 4-13
Summary of Constituents Detected in Groundwater Samples
Collected at SWMUs 38 and 39 in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

		SWMU 38						
SAMPLE ID	USEPA MCL	970821-LD-38-GW0026	970819-LD-38-GW0027	970819-LD-38-GW0028	970819-LD-38-GW0029	970821-LD-38 GW0030D	970821-LD-38 GW0030S	970821-LD-38-GW0037
LAB ID		86173-19	86173-2	86126-14	86126-13	86173-17	86173-15	86173-11
SAMPLE DATE		8/21/97	8/19/97	8/19/97	8/19/97	8/21/97	8/21/97	8/21/97
Volatile Organic Compounds (ug/L):								
Acetone	3700[1/]	120	<50	<50	<50	120	1000	<50
Benzene	5	13	<5	<5	<5	<5	<5	<5
Toluene	1000	7	<2	<2	<2	<2	<2	<2
Trichloroethene	5	<2	<2	<2	3	<2	<2	<2
Xylenes	10000	23	<5	<5	<5	<5	<5	<5
Semivolatile Organic Compounds (mg/L):		ND	ND	ND	ND	ND	ND	ND
Metals (mg/L):								
Barium, Total	2	0.26	0.08	0.14	0.51	0.5	0.13	0.07
Chromium, Total	0.1	0.02	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Copper, Total	1.3	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02
Zinc, Total	5	0.2	<0.02	<0.02	0.06	<0.02	0.18	0.05
Lead, Total	0.015	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025
Silver, Total	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyanide, Total (mg/L)	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

207

g:/Proj/TF320/Landdisp/rpt/table/3839gwsm.xls
11:15 AM 1/12/98

ARCADIS GERAGHTY & MILLER

TABLE 4-13
Summary of Constituents Detected in Groundwater Samples
Collected at SWMUs 38 and 39 in August 1997
Land Disposal Areas RFI
Sloss Industries Corporation

		SWMU 39							
SAMPLE ID	USEPA MCL	970821-LD-39-GW0031	970821-LD-39-GW0032	970820-LD-39-GW0033	970821-LD-39-GW0034D	970820-LD-39-GW0034S	970820-LD-39-GW9034S	970821-LD-39-GW0035	970821-LD-39-GW0036
LAB ID		86173-13	86173-14	86173-8	86173-18	86173-6	86173-7	86173-12	86173-9
SAMPLE DATE		8/21/97	8/21/97	8/20/97	8/21/97	8/20/97	8/20/97	8/21/97	8/21/97
Volatile Organic Compounds (ug/L):									
Acetone	3700[1/]	120	<50	<50	66	<50	<50	<50	<50
Benzene	5	<5	<5	<5	$\boxed{6}$	<5	<5	<5	<5
Toluene	1000	<2	<2	<2	<2	<2	<2	<2	<2
Trichloroethene	5	<2	<2	<2	<2	<2	<2	<2	<2
Xylenes	10000	<5	<5	<5	7	<5	<5	<5	<5
Semivolatile Organic Compounds (mg/L):		ND	ND	ND	ND	ND	ND	ND	ND
Metals (mg/L):									
Barium, Total	2	0.12	0.03	0.1	0.03	0.02	0.02	0.07	0.02
Chromium, Total	0.1	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Copper, Total	1.3	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02
Zinc, Total	5	<0.02	<0.02	<0.02	0.21	<0.02	<0.02	<0.02	0.05
Lead, Total	0.015	<0.025	<0.025	<0.025	$\boxed{0.04}$	<0.025	<0.025	<0.025	<0.025
Silver, Total	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	$\boxed{0.24}$
Cyanide, Total (mg/L)	0.2	0.03	$\boxed{0.38}$	0.14	<0.02	$\boxed{0.21}$	$\boxed{0.22}$	0.07	<0.02

ND Not detected. Analytes in this group were all below their respective detection limits.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
[1/] Source: USEPA Region III Risk Based Concentrations (RBC) for tap water, October 22, 1997
$\boxed{}$ Concentration exceeds USEPA MCL.

208

g:/Proj/TF320/Landdisp/rpt/table/3839gwsm.xls
11:15 AM 1/12/98

ARCADIS GERAGHTY & MILLER

TABLE 5-1
Occurrence Summary for Subsurface Soil Samples from SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Frequency Detects / Total	Range of SQLs Min – Max	Range of Detects Min – Max	Average Detect	Mean	UCL	EPC
VOCs (µg/kg)							
Acetone	1 / 8	57 - 75	110 - 110	110	42	61	61
Metals/Inorganics (mg/kg)							
Arsenic	8 / 8	NA	2.2 - 30	8.3	8.2	22	22
Barium	8 / 8	NA	14 - 180	64	67	160	160
Beryllium	1 / 8	0.60 - 0.70	0.7	0.70	0.36	0.45	0.45
Cadmium	2 / 8	0.60 - 0.70	2.4 - 2.5	2.5	0.83	2.7	2.5
Chromium	5 / 8	1.2 - 1.4	7.0 - 19	13	14	280	19
Copper	2 / 8	2.3 - 3.0	5.0 - 22	14	3.8	16	16
Cyanide	3 / 8	0.20 - 0.30	0.31 - 0.43	0.36	0.23	0.36	0.36
Lead	4 / 8	3.0 - 3.7	4.4 - 19	12	7.2	29	19
Nickel	5 / 8	2.3 - 2.9	8.8 - 66	33	35	1,000	66
Zinc	8 / 8	NA	32 - 430	100	93	230	230

EPC	Exposure point concentration; lesser of the UCL and the maximum detected concentration.
Mean	Arithmetic average of the total number of samples, using proxy concentrations for non-detects.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NA	Not available.
SQLs	Practical sample quantitation limits for the non-detects.
UCL	95 percent upper confidence limit (one-tailed) on the mean, assuming a log-normal distribution.
VOCs	Volatile organic compounds.

209

TABLE 5-2
Occurrence Summary for Sludge Samples from SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Frequency Detects / Total	Range of SQLs Min – Max		Range of Detects Min – Max	Average Detect	Mean	UCL	EPC
VOCs (µg/kg)								
2-Butanone (MEK)	2 / 4	1,060 - 1,060	*	250 - 530	390	470	920	530
Acetone	2 / 4	1,500 - 2,300		670 - 1,200	940	950	1,500	1,200
Ethylbenzene	1 / 4	24 - 230		220 - 220	220	130	510,000	220
Toluene	3 / 4	28 - 28		200 - 5,100	1,900	5,800	3.5E+13	5,100
Xylenes	3 / 4	24 - 24		96 - 900	550	1,200	4.E+09	900
SVOCs (µg/kg)								
4-Methylphenol	3 / 4	3,000		2,800 - 10,000	5,300	4,600	54,000	10,000
Acenaphthylene	4 / 4	NA		2,700 - 11,000	6,500	6,900	35,000	11,000
Anthracene	1 / 4	1,600 - 1,900		3,800 - 3,800	3,800	1,700	14,000	3,800
Benzo(a)anthracene	4 / 4	NA		5,300 - 45,000	23,000	27,000	700,000	45,000
Benzo(b)fluoranthene	4 / 4	NA		3,800 - 57,000	25,000	33,000	7,100,000	57,000
Benzo(g,h,i)perylene	4 / 4	NA		5,000 - 40,000	19,000	22,000	750,000	40,000
Benzo(k)fluoranthene	4 / 4	NA		5,300 - 27,000	15,000	16,000	250,000	27,000
Benzo(a)pyrene	4 / 4	NA		6,500 - 47,000	24,000	27,000	620,000	47,000
Chrysene	4 / 4	NA		3,700 - 39,000	17,000	20,000	810,000	39,000
Dibenzo(a,h)anthracene	1 / 4	1,600 - 1,900		3,200 - 3,200	3,200	1,500	8,100	3,200
Fluoranthene	4 / 4	NA		5,700 - 25,000	16,000	18,000	130,000	25,000
Fluorene	1 / 4	1,600 - 1,900		5,400 - 5,400	5,400	2,100	51,000	5,400
Indeno(1,2,3-cd)pyrene	4 / 4	NA		5,500 - 39,000	18,000	21,000	440,000	39,000
Naphthalene	1 / 4	1,600 - 3,000		4,100 - 4,100	4,100	1,900	17,000	4,100
Phenanthrene	3 / 4	1,600		3,500 - 14,000	7,300	7,200	1,400,000	14,000
Pyrene	4 / 4	NA		3,600 - 31,000	17,000	20,000	540,000	31,000
Metals/Inorganics (mg/kg)								
Arsenic	3 / 4	6.0		11 - 42	22	20	1,700	42
Barium	4 / 4	NA		160 - 450	310	320	830	450

Footnotes on page 2.

g:\proj\tf320\landdisp\rpt\table\5-02sldg.xls
11:18 AM 1/12/98

ARCADIS GERAGHTY&MILLER

TABLE 5-2
Occurrence Summary for Sludge Samples from SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Frequency Detects / Total	Range of SQLs Min – Max	Range of Detects Min – Max	Average Detect	Mean	UCL	EPC
Metals/Inorganics (mg/kg)							
Chromium	4 / 4	NA	65 - 190	130	130	320	190
Copper	4 / 4	NA	32 - 240	120	130	1,900	240
Cyanide	3 / 4	1.8	4.0 - 136	53	100	4.4E+09	140
Lead	4 / 4	NA	18 - 51	39	40	110	51
Mercury	4 / 4	NA	1.9 - 8.6	6.4	7.1	52	8.6
Nickel	4 / 4	NA	68 - 270	170	180	750	270
Selenium	4 / 4	NA	50 - 150	95	98	300	150
Silver	2 / 4	5.6 - 6.0	5.7 - 8.0	6.9	5.0	15	8.0
Zinc	4 / 4	NA	140 - 300	240	240	430	300

*	When SQL/2 exceeds the maximum detect (i.e., an unusually high SQL), the maximum detect is used as the proxy concentration.
EPC	Exposure point concentration; lesser of the UCL and the maximum detected concentration.
Mean	Arithmetic average of the total number of samples, using proxy concentrations for non-detects.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NA	Not available.
SQLs	Practical sample quantitation limits for the non-detects.
SVOCs	Semivolatile organic compounds.
UCL	95 percent upper confidence limit (one-tailed) on the mean, assuming a log-normal distribution.
VOCs	Volatile organic compounds.

211

TABLE 5-3
Occurrence Summary for Surficial Soil Samples from SWMU 24
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Frequency Detects / Total	Range of SQLs Min – Max		Range of Detects Min – Max	Average Detect	Mean	UCL	EPC
VOCs (µg/kg)								
Acetone	1 / 15	57 - 93		150	150	40	50	50
SVOCs (µg/kg)								
Acenaphthene	1 / 15	380 - 920	*	460	460	250	290	290
Acenaphthylene	5 / 15	400 - 460		568 - 9,400	2,500	690	1,600	1,600
Anthracene	4 / 15	400 - 610		410 - 10,000	3,000	620	1,400	1,400
Benzo(a)anthracene	8 / 15	400 - 460		590 - 63,000	9,700	2,900	16,000	16,000
Benzo(b)fluoranthene	6 / 15	400 - 460		540 - 33,000	6,900	1,700	7,200	7,200
Benzo(g,h,i)perylene	6 / 15	400 - 460		720 - 22,000	5,300	1,700	6,400	6,400
Benzo(k)fluoranthene	7 / 15	400 - 460		500 - 16,000	3,200	1,100	3,100	3,100
Benzo(a)pyrene	8 / 15	400 - 460		430 - 36,000	5,600	1,800	6,900	6,900
Chrysene	7 / 15	400 - 610		470 - 39,000	6,800	1,700	7,000	7,000
Dibenzo(a,h)anthracene	1 / 15	380 - 1,040	*	570	570	260	310	310
Fluoranthene	7 / 15	400 - 610		690 - 46,000	8,200	2,400	11,000	11,000
Fluorene	2 / 15	380 - 2,400	*	490 - 1,200	850	350	510	510
Indeno(1,2,3-cd)pyrene	6 / 15	400 - 460		650 - 22,000	5,100	1,500	5,700	5,700
Naphthalene	3 / 15	380 - 610		490 - 6,300	2,500	470	880	880
Phenanthrene	5 / 15	400 - 610		500 - 14,000	4,000	1,100	3,100	3,100
Pyrene	7 / 15	400 - 610		460 - 55,000	9,500	2,400	13,000	13,000
Metals/Inorganics (mg/kg)								
Antimony	2 / 15	5.8 - 9.4		7.4 - 13	10	4.2	5.2	5.2
Arsenic	15 / 15	NA		5.5 - 21	11	11	14	14
Barium	15 / 15	NA		28 - 190	89	91	130	130
Beryllium	5 / 15	0.58 - 0.94		1.2 - 2.1	1.5	0.73	1.2	1.2
Cadmium	9 / 15	0.60 - 0.70		0.83 - 10	3.5	2.3	6.2	6.2
Chromium	15 / 15	NA		8.1 - 162	35	33	59	59
Copper	15 / 15	NA		10 - 92	33	33	52	52

Footnotes on page 2.

212

TABLE 5-3
Occurrence Summary for Surficial Soil Samples from SWMU 24
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Frequency Detects / Total	Range of SQLs Min – Max	Range of Detects Min – Max	Average Detect	Mean	UCL	EPC
Metals/Inorganics (mg/kg)							
Cyanide	14 / 15	0.30	0.70 - 5.6	2.1	2.2	4.1	4.1
Lead	14 / 15	3.5	13 - 300	91	110	380	300
Mercury	4 / 15	0.29 - 0.36	0.35 - 0.63	0.50	0.25	0.34	0.34
Nickel	15 / 15	NA	5.0 - 45	19	20	30	30
Silver	4 / 15	1.2 - 1.9	1.6 - 3.2	2.4	1.1	1.6	1.6
Zinc	15 / 15	NA	25 - 2,200	630	770	2,500	2,200

*	When SQL/2 exceeds the maximum detect (i.e., an unusually high SQL), the maximum detect is used as the proxy concentration.
EPC	Exposure point concentration; lesser of the UCL and the maximum detected concentration.
Mean	Arithmetic average of the total number of samples, using proxy concentrations for non-detects.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NA	Not available.
SQLs	Practical sample quantitation limits for the non-detects.
SVOCs	Semivolatile organic compounds.
UCL	95 percent upper confidence limit (one-tailed) on the mean, assuming a log-normal distribution.
VOCs	Volatile organic compounds.

TABLE 5-4
Occurrence Summary for Sludge Samples for SWMU 24
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Frequency Detects / Total	Range of SQLs Min – Max	Range of Detects Min – Max	Average Detect	Mean	UCL	EPC
Metals/Inorganics							
Antimony	4 / 4	NA	15 - 18	17	17	19	18
Arsenic	4 / 4	NA	15 - 18	16	16	18	18
Barium	4 / 4	NA	200 - 240	230	230	250	240
Beryllium	4 / 4	NA	2.4 - 3.1	2.7	2.7	3.1	3.1
Cadmium	4 / 4	NA	7.9 - 11	9.0	9.0	11	11
Chromium	4 / 4	NA	50 - 180	130	140	530	180
Copper	4 / 4	NA	85 - 130	100	100	140	130
Cyanide	4 / 4	NA	2.4 - 4.7	3.5	3.6	5.6	4.7
Lead	4 / 4	NA	240 - 1,703	700	750	13,000	1,700
Nickel	4 / 4	NA	33 - 43	39	39	46	43
Silver	4 / 4	NA	2.8 - 6.1	4.2	4.2	8.4	6.1
Zinc	4 / 4	NA	2,300 - 4,500	3,200	3,200	5,000	4,500

All concentrations are reported in milligrams per kilogram (mg/kg).

EPC	Exposure point concentration; lesser of the UCL and the maximum detected concentration.
Mean	Arithmetic average of the total number of samples, using proxy concentrations for non-detects.
NA	Not available.
SQLs	Practical sample quantitation limits for the non-detects.
UCL	95 percent upper confidence limit (one-tailed) on the mean, assuming a log-normal distribution.

214

TABLE 5-5
Occurrence Summary for Subsurface Soil Samples from SWMUs 38 and 39
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Frequency Detects / Total	Range of SQLs Min – Max	Range of Detects Min – Max	Average Detect	Mean	UCL	EPC
VOCs (µg/kg)							
Toluene	1 / 17	6.0 - 7.0	8.0	8.0	3.6	4.0	4.0
Metals/Inorganics (mg/kg)							
Antimony	1 / 17	5.9 - 7.6	9.6	9.6	3.6	4.1	4.1
Arsenic	15 / 17	1.3 - 1.3	1.8 - 5.2	3.5	3.3	4.8	4.8
Barium	17 / 17	NA	2.4 - 420	110	150	400	400
Beryllium	2 / 17	0.60 - 0.80	1.9 - 2.8	2.4	0.52	0.74	0.74
Chromium	17 / 17	NA	2.4 - 19	10	11	14	14
Copper	9 / 17	2.3 - 3.0	4.3 - 110	20	9.1	25	25
Cyanide	2 / 19	0.20 - 0.30	0.70 - 1.25	0.98	0.20	0.28	0.28
Lead	11 / 17	2.9 - 3.8	5.0 - 36	12	9.0	18	18
Nickel	12 / 17	2.3 - 2.7	3.0 - 32	14	12	29	29
Silver	1 / 17	1.2 - 1.5	7.6 - 7.6	7.6	0.90	1.2	1.2
Zinc	17 / 17	NA	10 - 190	60	62	91	91

EPC Exposure point concentration; lesser of the UCL and the maximum detected concentration.
Mean Arithmetic average of the total number of samples, using proxy concentrations for non-detects.
µg/kg Micrograms per kilogram.
mg/kg Milligrams per kilogram.
NA Not available.
SQLs Practical sample quantitation limits for the non-detects.
UCL 95 percent upper confidence limit (one-tailed) on the mean, assuming a log-normal distribution.
VOCs Volatile organic compounds.

215

TABLE 5-6
Occurrence Summary for Sludge Samples from SWMU 39
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Frequency Detects / Total	Range of SQLs Min – Max	Range of Detects Min – Max	Average Detect	Mean	UCL	EPC
PAHs (µg/kg)							
Benzo(k)fluoranthene	1 / 4	370 - 410	630	630	310	1,300	630
Metals/Inorganics (mg/kg)							
Antimony	4 / 4	NA	11 - 15	13	13	15	15
Arsenic	4 / 4	NA	3.8 - 8.8	7.0	7.1	14	8.8
Barium	4 / 4	NA	85 - 260	190	200	600	260
Beryllium	2 / 4	0.60	1.6 - 2.3	2.0	1.4	120	2.3
Cadmium	4 / 4	NA	5.0 - 12	8.6	8.8	20	12
Copper	3 / 4	2.5	7.2 - 160	96	310	2.4E+11	160
Cyanide	3 / 4	0.20	3.2 - 8.3	5.4	14	5.1E+07	8.3
Lead	4 / 4	NA	30 - 320	220	310	43,000	320
Nickel	4 / 4	NA	9.6 - 25	17	17	41	25
Silver	2 / 4	1.2 - 1.3	3.4 - 4.6	4.0	2.8	230	4.6
Zinc	4 / 4	NA	600 - 3,100	2,000	2,200	22,000	3,100

EPC Exposure point concentration; lesser of the UCL and the maximum detected concentration.
Mean Arithmetic average of the total number of samples, using proxy concentrations for non-detects.
µg/kg Micrograms per kilogram.
mg/kg Milligrams per kilogram.
NA Not available.
PAHs Polycyclic aromatic hydrocarbons.
SQLs Practical sample quantitation limits for the non-detects.
UCL 95 percent upper confidence limit (one-tailed) on the mean, assuming a log-normal distribution.

TABLE 5-7
Occurrence Summary for Groundwater Samples from SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Frequency Detects / Total	Range of SQLs Min – Max	Range of Detects Min – Max	Average Detect	Mean	UCL	EPC
VOCs (µg/kg)							
Acetone	1 / 6	50 - 50	110	110	38	84	84
Metals/Inorganics (mg/kg)							
Barium	6 / 6	NA	0.050 - 0.29	0.12	0.13	0.28	0.28
Chromium	4 / 6	0.010 - 0.010	0.010 - 0.030	0.018	0.014	0.040	0.030
Copper	2 / 6	0.020 - 0.020	0.020 - 0.020	0.020	0.013	0.020	0.020
Cyanide	1 / 6	0.020 - 0.020	0.050	0.050	0.016	0.040	0.040
Nickel	3 / 6	0.020 - 0.020	0.020 - 0.040	0.027	0.019	0.038	0.038
Zinc	5 / 6	0.020 - 0.020	0.050 - 0.11	0.084	0.085	0.40	0.11

EPC Exposure point concentration; lesser of the UCL and the maximum detected concentration.
Mean Arithmetic average of the total number of samples, using proxy concentrations for non-detects.
µg/kg Micrograms per kilogram.
mg/kg Milligrams per kilogram.
NA Not available.
SQLs Practical sample quantitation limits for the non-detects.
UCL 95 percent upper confidence limit (one-tailed) on the mean, assuming a log-normal distribution.
VOCs Volatile organic compounds.

217

TABLE 5-8
Occurrence Summary for Groundwater Samples from SWMUs 38 and 39
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Frequency Detects / Total	Range of SQLs Min – Max	Range of Detects Min – Max	Average Detect	Mean	UCL	EPC
VOCs (µg/kg)							
Acetone	5 / 14	50 - 50	66 - 1,000	290	89	220	220
Benzene	2 / 14	5.0 - 5.0	6.0 - 13	9.5	3.4	4.4	4.4
Toluene	1 / 14	2.0 - 2.0	7.0	7.0	1.3	1.8	1.8
Trichloroethene	1 / 14	2.0 - 5.0	3.0	3.0	1.2	1.5	1.5
Xylenes	2 / 14	5.0 - 5.0	23	15	3.9	5.7	5.7
Metals/Inorganics (mg/kg)							
Barium	14 / 14	NA	0.020 - 0.51	0.15	0.16	0.37	0.37
Chromium	3 / 14	0.010 - 0.010	0.010 - 0.020	0.013	0.0067	0.0084	0.0084
Copper	2 / 14	0.020 - 0.020	0.020 - 0.030	0.025	0.012	0.014	0.014
Cyanide	5 / 14	0.020 - 0.020	0.030 - 0.38	0.17	0.060	0.22	0.22
Lead	1 / 14	0.025 - 0.025	0.040	0.040	0.014	0.017	0.017
Silver	1 / 14	0.010 - 0.010	0.24	0.24	0.011	0.026	0.026
Zinc	6 / 14	0.020 - 0.020	0.050 - 0.21	0.13	0.061	0.19	0.19

EPC Exposure point concentration; lesser of the UCL and the maximum detected concentration.
Mean Arithmetic average of the total number of samples, using proxy concentrations for non-detects.
µg/kg Micrograms per kilogram.
mg/kg Milligrams per kilogram.
NA Not available.
SQLs Practical sample quantitation limits for the non-detects.
UCL 95 percent upper confidence limit (one-tailed) on the mean, assuming a log-normal distribution.
VOCs Volatile organic compounds.

218

TABLE 5-9
Selection of Constituents of Concern in Subsurface Soil for SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Maximum Concentration	Background Concentration	Industrial Risk-Based Screening Value	COC Basis
VOCs (µg/kg)				
Acetone	110	NAP	20,000,000	no/B
Inorganics (mg/kg)				
Arsenic	30	11	3.8	YES/A
Barium	180	52	14,000	no/B
Beryllium	0.70	0.58	1.3	no/B
Cadmium	2.5	NAP	100	no/B
Chromium	19	30	1,000	no/B
Copper	22	8.3	100,000	no/B
Cyanide	0.43	NAP	4,100	no/B
Lead	19	12	400	no/B
Nickel	66	8.1	4,100	no/B
Zinc	430	31	61,000	no/B

A Greater than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
B Less than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
COC Constituent of concern.
µg/kg Micrograms per kilogram.
mg/kg Milligrams per kilogram.
NAP Not applicable.
VOCs Volatile organic compounds.

TABLE 5-10
Selection of Constituents of Concern in Sludge for SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Maximum Concentration	Background Concentration	Residential Risk-Based Screening Value	COC Basis
Carcinogenic PAHs (µg/kg)				
Benzo(a)anthracene	45,000	NAP	880	YES/A, C
Benzo(b)fluoranthene	57,000	NAP	880	YES/A, C
Benzo(k)fluoranthene	27,000	NAP	8,800	YES/A, C
Benzo(a)pyrene	47,000	NAP	88	YES/A, C
Chrysene	39,000	NAP	88,000	YES/C
Dibenzo(a,h)anthracene	3,200	NAP	88	YES/A, C
Indeno(1,2,3-cd)pyrene	39,000	NAP	880	YES/A, C
Non-Carcinogenic PAHs (µg/kg)				
Acenaphthylene*	11,000	NAP	230,000	no/B
Anthracene	3,800	NAP	2,300,000	no/B
Benzo(g,h,i)perylene*	40,000	NAP	230,000	no/B
Fluoranthene	25,000	NAP	310,000	no/B
Fluorene	5,400	NAP	310,000	no/B
Naphthalene	4,100	NAP	310,000	no/B
Phenanthrene*	14,000	NAP	230,000	no/B
Pyrene	31,000	NAP	230,000	no/B
VOCs (µg/kg)				
2-Butanone (MEK)	530	NAP	4,700,000	no/B
Acetone	1,200	NAP	780,000	no/B
Ethylbenzene	220	NAP	780,000	no/B
Toluene	5,100	NAP	1,600,000	no/B
Xylenes	900	NAP	16,000,000	no/B
SVOCs (µg/kg)				
4-Methylphenol	10,000	NAP	39,000	no/B
Inorganics (mg/kg)				
Arsenic	42	11	0.43	YES/A
Barium	450	52	550	no/B
Chromium	190	30	39	YES/A
Copper	240	8.3	27,000	no/B
Cyanide	136	NAP	160	no/B
Lead	51	12	400	no/B
Mercury	8.6	0.034	2.3	YES/A
Nickel	270	8.1	160	YES/A
Selenium	150	NAP	39	YES/A
Silver	8.0	NAP	39	no/B
Zinc	300	31	2,300	no/B

Footnotes appear on page 2.

TABLE 5-10
Selection of Constituents of Concern in Sludge for SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Concentrations are reported in milligrams per kilogram (mg/kg).

*	Pyrene used as a surrogate.
A	Greater than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
B	Less than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
C	The chemical is a member of a chemical class which contains other COCs.
COC	Constituent of concern.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NAP	Not applicable.
PAHs	Polycyclic aromatic hydrocarbons.
SVOCs	Semivolatile organic compounds.
VOCs	Volatile organic compounds.

TABLE 5-11
Selection of Constituents of Concern in Surficial Soils for SWMU 24
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Maximum Concentration	Background Concentration	Residential Risk-Based Screening Value	COC Basis
Carcinogenic PAHs (µg/kg)				
Benzo(a)anthracene	63,000	NAP	880	YES/A, C
Benzo(b)fluoranthene	33,000	NAP	880	YES/A, C
Benzo(k)fluoranthene	16,000	NAP	8,800	YES/A, C
Benzo(a)pyrene	36,000	NAP	88	YES/A, C
Chrysene	39,000	NAP	88,000	YES/C
Dibenzo(a,h)anthracene	570	NAP	88	YES/A, C
Indeno(1,2,3-cd)pyrene	22,000	NAP	880	YES/A, C
Non-Carcinogenic PAHs (µg/kg)				
Acenaphthene	460	NAP	470,000	no/B
Acenaphthylene*	9,400	NAP	230,000	no/B
Anthracene	10,000	NAP	2,300,000	no/B
Benzo(g,h,i)perylene*	22,000	NAP	230,000	no/B
Fluoranthene	46,000	NAP	310,000	no/B
Fluorene	1,200	NAP	310,000	no/B
Naphthalene	6,300	NAP	310,000	no/B
Phenanthrene*	14,000	NAP	230,000	no/B
Pyrene	55,000	NAP	230,000	no/B
VOCs (µg/kg)				
Acetone	150	NAP	780,000	no/B
Inorganics (mg/kg)				
Antimony	13	NAP	3.1	YES/A
Arsenic	21	11	0.43	no/D
Barium	190	52	550	no/B
Beryllium	2.1	0.58	0.15	YES/A
Cadmium	10	NAP	3.9	YES/A
Chromium	162	30	39	YES/A
Copper	92	8.3	27,000	no/B
Cyanide	5.6	NAP	160	no/B
Lead	300	12	400	no/B
Mercury	0.63	0.034	2.3	no/B
Nickel	45	8.1	160	no/B
Silver	3.2	NAP	39	no/B
Zinc	2,200	31	2,300	no/B

Footnotes appear on page 2.

TABLE 5-11
Selection of Constituents of Concern in Surficial Soils for SWMU 24
Land Disposal Areas RFI
Sloss Industries Corporation

Concentrations are reported in milligrams per kilogram (mg/kg).

*	Pyrene used as a surrogate.
A	Greater than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
B	Less than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
C	The chemical is a member of a chemical class which contains other COCs.
D	Less than 2X background concentration.
COC	Constituent of concern.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NAP	Not applicable.
PAHs	Polycyclic aromatic hydrocarbons.
VOCs	Volatile organic compounds.

TABLE 5-12
Selection of Constituents of Concern in Sludge for SWMU 24
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Maximum Concentration	Background Concentration	Residential Risk-Based Screening Value	COC Basis
Inorganics				
Antimony	18	NAP	3.1	YES/A
Arsenic	18	11	0.43	no/D
Barium	240	52	550	no/B
Beryllium	3.1	0.58	0.15	YES/A
Cadmium	11	NAP	3.9	YES/A
Chromium	180	30	39	YES/A
Copper	130	8.3	27,000	no/B
Cyanide	4.7	NAP	160	no/B
Lead	1,703	12	400	YES/A
Nickel	43	8.1	160	no/B
Silver	6.1	NAP	39	no/B
Zinc	4,500	31	2,300	YES/A

Concentrations are reported in milligrams per kilogram (mg/kg).

A	Greater than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
B	Less than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
C	The chemical is a member of a chemical class which contains other COCs.
D	Less than 2X background concentration.
COC	Constituent of concern.
NAP	Not applicable.

TABLE 5-13
Selection of Constituents of Concern in Subsurface Soil for SWMUs 38 and 39
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Maximum Concentration	Background Concentration	Industrial Risk-Based Screening Value	COC Basis
VOCs (µg/kg)				
Toluene	8.0	NAP	41,000,000	no/B
Inorganics (mg/kg)				
Antimony	9.6	NAP	82	no/B
Arsenic	5.2	11	3.8	no/D
Barium	420	52	14,000	no/B
Beryllium	2.8	0.58	1.3	YES/A
Chromium	19	30	1,000	no/B
Copper	110	8.3	100,000	no/B
Cyanide	1.3	NAP	4,100	no/B
Lead	36	12	400	no/B
Nickel	32	8.1	4,100	no/B
Silver	7.6	NAP	1,000	no/B
Zinc	190	31	61,000	no/B

A	Greater than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
B	Less than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
C	The chemical is a member of a chemical class which contains other COCs.
D	Less than 2X background concentration.
COC	Constituent of concern.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NAP	Not applicable.
VOCs	Volatile organic compounds.

TABLE 5-14
Selection of Constituents of Concern in Sludge for SWMU 39
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Maximum Concentration	Background Concentration	Residential Risk-Based Screening Value	COC Basis
Carcinogenic PAHs (µg/kg)				
Benzo(k)fluoranthene	630	NAP	8,800	no/B
Inorganics (mg/kg)				
Antimony	15	NAP	3.1	YES/A
Arsenic	8.8	11	0.43	no/D
Barium	260	52	550	no/B
Beryllium	2.3	0.58	0.15	YES/A
Cadmium	12	NAP	3.9	YES/A
Copper	160	8.3	27,000	no/B
Cyanide	8.3	NAP	160	no/B
Lead	320	12	400	no/B
Nickel	25	8.1	160	no/B
Silver	4.6	NAP	39	no/B
Zinc	3,100	31	2,300	YES/A

Concentrations are reported in milligrams per kilogram (mg/kg).

A	Greater than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
B	Less than risk-based concentration (10^{-6} for carcinogens and HQ=0.1 for non-carcinogens).
C	The chemical is a member of a chemical class which contains other COCs.
D	Less than 2X background concentration.
COC	Constituent of concern.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NAP	Not applicable.
PAHs	Polycyclic aromatic hydrocarbons.

TABLE 5-15
Summary of Constituents of Concern for Human Health Risk Assessment by Medium
Land Disposal Areas RFI
Sloss Industries Corporation

	Surficial Soil	Subsurface Soil		Sludge		
Constituents	SWMU 24	SWMU 23	SWMUs 38 & 39	SWMU 23	SWMU 24	SWMU 39
PAHs						
Benzo(a)anthracene	X			X		
Benzo(b)fluoranthene	X			X		
Benzo(k)fluoranthene	X			X		
Benzo(a)pyrene	X			X		
Chrysene	X			X		
Dibenzo(a,h)anthracene	X			X		
Indeno(1,2,3-cd)pyrene	X			X		
Inorganics						
Antimony	X				X	X
Arsenic		X		X		
Beryllium	X		X		X	X
Cadmium	X				X	X
Chromium	X			X	X	
Lead					X	
Mercury				X		
Nickel				X		
Selenium				X		
Zinc					X	X

PAHs Polycyclic aromatic hydrocarbons.
SWMU Solid waste management unit.

227

TABLE 5-16
Oral Reference Doses, Inhalation Reference Concentrations, Target Sites and Confidence Levels for Constituents of Concern
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	RfDo (mg/kg/day)		RfC (mg/m^3)		Target Sites		Confidence Level/ Uncertainty Factor	
	Subchronic	Chronic	Subchronic	Chronic	Oral	Inhalation	Oral	Inhalation
PAHs*								
Benzo(a)anthracene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000	NA
Benzo(b)fluoranthene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000	NA
Benzo(k)fluoranthene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000	NA
Benzo(a)pyrene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000	NA
Chrysene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000	NA
Dibenz(a,h)anthracene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000	NA
Indeno(1,2,3-c,d)pyrene	3.0E-01	3.0E-02	NA	NA	kidney	NA	low/3000	NA
Inorganics								
Antimony	4.0E-04	4.0E-04	NA	NA	increased mortality	NA	low/1000	NA
Arsenic	3.0E-04	3.0E-04	NA	NA	skin	NA	medium/3	NA
Beryllium	5.0E-03	5.0E-03	NA	NA	none	NA	low/100	NA
Cadmium (food)**	NA	1.0E-03	NA	NA	kidney	NA	high/10	NA
Chromium III	1.0E+00	1.0E+00	NA	NA	liver	NA	low/100	NA
Chromium VI	2.0E-02	5.0E-03	NA	NA	NR	NA	low/500	NA
Lead	NA	NA	NA	NA	CNS	CNS	NA	NA
Mercury	NA	NA	3.0E-04	3.0E-04	kidney	CNS	NA	medium/30
Nickel	2.0E-02	2.0E-02	NA	NA	decreased body weight	NA	medium/300	NA
Selenium	5.0E-03	5.0E-03	NA	NA	selenosis	NA	medium/3	NA
Zinc	3.0E-01	3.0E-01	NA	NA	anemia	NA	medium/3	NA

References: IRIS, 1997; USEPA, 1997b.

*	Toxocity values are not available. Pyrene used as a surrogate for non-cancer effects.
**	The RfD for food is used to assess soil exposure.
CNS	Central nervous system.
mg/kg/day	Milligrams per kilogram per day.
mg/m^3	Milligrams per cubic meter.
NA	Not available.
NR	None reported.
PAHs	Polycyclic aromatic hydrocarbons.
RfC	Reference concentration.
RfDo	Oral reference dose.

228

TABLE 5-17
Oral and Inhalation Cancer Slope Factors, Tumor Sites, and USEPA Cancer Classifications for Constituents of Concern
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Oral CSF (kg-day/mg)	TEF	Inhalation Unit Risk ($m^3/\mu g$)	Tumor site Oral	Tumor site Inhalation	USEPA Classification
PAHs*						
Benzo(a)anthracene	7.3E-01	0.1	8.8E-05	stomach	respiratory tract	B2
Benzo(b)fluoranthene	7.3E-01	0.1	8.8E-05	stomach	respiratory tract	B2
Benzo(k)fluoranthene	7.3E-02	0.01	8.8E-06	stomach	respiratory tract	B2
Benzo(a)pyrene	7.3E+00	1.0	8.8E-04	stomach	respiratory tract	B2
Chrysene	7.3E-03	0.001	8.8E-07	stomach	respiratory tract	B2
Dibenz(a,h)anthracene	7.3E+00	1.0	8.8E-04	stomach	respiratory tract	B2
Indeno(1,2,3-c,d)pyrene	7.3E-01	0.1	8.8E-05	stomach	respiratory tract	B2
Inorganics						
Arsenic	1.5E+00	NAP	4.3E-03	skin	respiratory tract	A
Beryllium	4.3E+00	NAP	2.4E-03	total tumors	lung	B2
Cadmium	NAP	NAP	1.8E-03	NA	respiratory tract	B1
Chromium VI	NAP	NAP	1.2E-02	NA	lung	A
Lead	NA	NAP	NA	NA	NA	B2
Nickel (refinery dust)	NAP	NAP	2.4E-04	NA	respiratory tract	A

References: IRIS, 1997; USEPA, 1997a.

*	Benzo(a)pyrene used as a surrogate. Appropriate toxicity value obtained by multiplying the benzo(a)pyrene toxicity values by the TEF.
CSF	Cancer slope factor.
kg-day/mg	Kilograms-day per milligram.
$m^3/\mu g$	Cubic meters per microgram.
NA	Not available.
NAP	Not applicable.
PAHs	Polycyclic aromatic hydrocarbons.
TEF	Toxicity equivalency factor.

229

j:\proj\tf320\landdisp\rpt\table\5-17csf.xls
11:38 AM 1/12/98

ARCADIS GERAGHTY&MILLER

TABLE 5-18
Dermal and Oral Absorption Efficiencies
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Absorption Efficiency Dermal		Oral	
PAHs	0.03	c	0.85	c
Inorganics				
Antimony	0.001	a	0.01	c
Arsenic	0.001	a	0.95	c
Beryllium	NAP		0.009	c
Cadmium	0.018	c	0.02	c
Chromium	0.001	a	0.02	c
Lead	0.0006	c	0.15	c
Mercury	0.026	c	0.15	c
Nickel	0.0023	c	0.043	c
Selenium	0.001	a	0.97	c
Zinc	0.001	a	0.30	c

a USEPA, 1996a.
b Assumed.
c ATSDR, 1997.
NAP Not applicable.
PAHs Polycyclic aromatic hydrocarbons.

g:\proj\tf320\landdisp\rpt\table\5-18abs.xls

ARCADIS GERAGHTY & MILLER

TABLE 5-19
Adjusted Toxicity Values Used to Assess Dermal Exposure for Constituents of Concern
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	RfDo (mg/kg/day) Subchronic	RfDo (mg/kg/day) Chronic	CSFo (kg-day/mg)	Oral Absorption Efficiency	RfDa (mg/kg/day) Subchronic	RfDa (mg/kg/day) Chronic	CSFa (kg-day/mg)
PAHs							
Benzo(a)anthracene	3.0E-01	3.0E-02	7.3E-01	0.85	2.6E-01	2.6E-02	8.6E-01
Benzo(b)fluoranthene	3.0E-01	3.0E-02	7.3E-01	0.85	2.6E-01	2.6E-02	8.6E-01
Benzo(k)fluoranthene	3.0E-01	3.0E-02	7.3E-02	0.85	2.6E-01	2.6E-02	8.6E-02
Benzo(a)pyrene	3.0E-01	3.0E-02	7.3E+00	0.85	2.6E-01	2.6E-02	8.6E+00
Chrysene	3.0E-01	3.0E-02	7.3E-03	0.85	2.6E-01	2.6E-02	8.6E-03
Dibenzo(a,h)anthracene	3.0E-01	3.0E-02	7.3E+00	0.85	2.6E-01	2.6E-02	8.6E+00
Indeno(1,2,3-c,d)pyrene	3.0E-01	3.0E-02	7.3E-01	0.85	2.6E-01	2.6E-02	8.6E-01
Inorganics							
Antimony	4.0E-04	4.0E-04	NC	0.01	4.0E-06	4.0E-06	NC
Arsenic	3.0E-04	3.0E-04	1.5E+00	0.95	2.9E-04	2.9E-04	1.6E+00
Beryllium	5.0E-03	5.0E-03	4.3E+00	0.009	NAP	NAP	NAP
Cadmium (food)	NA	1.0E-03	NAP	0.02	NA	2.0E-05	NAP
Chromium III	1.0E+00	1.0E+00	NC	0.02	2.0E-02	2.0E-02	NC
Chromium VI	2.0E-02	5.0E-03	NAP	0.02	4.0E-04	1.0E-04	NAP
Lead	NA	NA	NA	0.15	NA	NA	NA
Mercury	NA	NA	NC	0.15	NA	NA	NC
Nickel	2.0E-02	2.0E-02	NAP	0.043	8.6E-04	8.6E-04	NAP
Selenium	5.0E-03	5.0E-03	NC	0.97	4.9E-03	4.9E-03	NC
Zinc	3.0E-01	3.0E-01	NC	0.30	9.0E-02	9.0E-02	NC

CSF Cancer slope factor (CSFo = oral; CSFa = adjusted).
kg-day/mg Kilograms-day per milligram.
mg/kg/day Milligrams per kilogram per day.
NA Not available.
NAP Not applicable.
NC Not evaluated as a carcinogen.
PAHs Polycyclic aromatic hydrocarbons.
RfD Reference dose (RfDo = oral; RfDa = adjusted).

231

TABLE 5-20
Physical and Chemical Properties of Organic Constituents of Concern
Land Disposal Areas RF1
Sloss Industries Corporation

Constituent	Molecular Weight (g/mol)	Water Solubility (mg/L 25 °C)	Specific Gravity	Vapor Pressure (mm Hg 25 °C)	Henry's Law Constant (atm-m³/mol) (25 °C)	Diffusivity (cm²/sec)	Koc (mL/g)
PAHs							
Benzo(a)anthracene	228	0.0094 - 0.014	1.27	1.1E-07	8.00E-06	0.04564	1,400,000
Benzo(b)fluoranthene	252	0.0012	NA	5.0E-07	1.20E-05	0.04392	550,000
Benzo(k)fluoranthene	252	0.00055	NA	9.59E-11	1.04E-03	0.04392	4,400,000
Benzo(a)pyrene	252	0.0038 - 0.004	1.35	5.49E-09	< 2.4E-06	0.04653	398,000 - 1,900,000
Chrysene	228	0.0018 - 0.006	1.27	6.3E-09	3.15E-07	0.04531	240,000
Dibenzo(a,h)anthracene	278	0.00249 - 0.005	1.28	~10E-10 (20 °C)	7.33E-09	0.05707	1,700,000
Indeno(1,2,3-c,d)pyrene	276	0.062	NA	1.0E-09	2.96E-20	0.05728	31,000,000

References: Lyman et al., 1990; Montgomery and Welkom, 1990.

atm-m³/mol	Atmospheres-cubic meters per mole.	mg/L	Milligrams per liter.
°C	Degrees Celsius.	mm Hg	Millimeters of mercury.
cm²/sec	Square centimeters per second.	NA	Not available.
g/mol	Grams per mole.	PAHs	Polycyclic aromatic hydrocarbons.
Koc	Organic carbon partition coefficient.		

232

TABLE 5-21
Receptor-Specific Exposure Parameters
Land Disposal Areas RFI
Sloss Industries Corporation

		Site Worker			Construction Worker	
Parameter	(units)	SWMU 23	SWMU 24	SWMU 38 & 39	SWMU 23	SWMU 38 & 39
APc	(days)	25550	25550	25550	25550	25550
APnc	(days)	4380	9125	9125	365	365
BW	(kg)	70	70	70	70	70
EF	(days/year)	12	250	250	90	90
EP	(years)	25	25	25	1	1
ET	(hours/day)	2	8	8	8	8
IRS	(mg/day)	50	50	50	480	480
SSA	(cm^2)	3160	3160	3160	3160	3160

References: USEPA (1989, 1996a, 1995); professional judgement.

APc	Averaging period for cancer risk.
APnc	Averaging period for non-cancer risk.
BW	Body weight.
cm^2	Square centimeters.
EF	Exposure frequency.
EP	Exposure period.
ET	Exposure time.
IRs	Incidental ingestion rate of soil.
kg	Kilogram.
mg	Milligram.
SSA	Exposed skin surface area.
SWMU	Solid waste management unit.

TABLE 5-22
Risk Equations for Worker Exposure to Sludge, Surficial and Subsurface Soil
Land Disposal Areas RFI
Sloss Industries Corporation

ROUTE-SPECIFIC RISKS:

Oral:

$$\frac{ELCR_o \text{ or}}{HQ_o} = \frac{EPC_S \times IR_S \times EF \times EP}{UC_1 \times BW \times (AP_C \text{ or } AP_{NC}) \times [(1/CSF_0) \text{ or } RfD_0]}$$

Dermal:

$$\frac{ELCR_d \text{ or}}{HQ_d} = \frac{EPC_S \times SSA \times SAR \times ABS \times EF \times EP}{UC_1 \times BW \times (AP_C \text{ or } AP_{NC}) \times [(1/CSF_a) \text{ or } RfD_a]}$$

Inhalation:

$$\frac{ELCR_i \text{ or}}{HQ_i} = \frac{EPC_S \times (1/VF + 1/PEF) \times ET \times EF \times EP}{UC_2 \times (AP_C \text{ or } AP_{NC}) \times [(UC_3 / UR_i) \text{ or } RfC]}$$

where:

$$VF = Q/C \times \frac{(3.1416 \times \alpha \times T)^{1/2}}{2 \times Dei \times Pa \times Kas} \times UC_4$$

$$PEF = Q/C \times \frac{3{,}600 \text{ sec/ hr}}{RPF \times (1-G) \times (Um/Ut)^3 \times F_x}$$

$$\alpha = \frac{Dei \times Pa}{Pa + [\rho s \times (1 - Pa)/Kas]}$$

$$Dei = Di \times (Pa^{3.33} / Pt^2)$$

$$K_{as} = H/(RT \times K_d)$$

CANCER RISK:

$$ELCR = ELCR_o + ELCR_d + ELCR_i$$

NON-CANCER RISK:

$$HI = HQ_o + HQ_d + HQ_i$$

TABLE 5-22
Risk Equations for Worker Exposure to Sludge, Surficial and Subsurface Soil
Land Disposal Areas RFI
Sloss Industries Corporation

where:

α	Alpha; calculation intermediate (cm^2/sec).
ABS	Dermal absorption efficiency.
AP_C	Averaging period for cancer effects (25,550 days); 70 yrs × 365 days/year.
AP_{NC}	Averaging period for non-cancer effects (days); (EP × 365 days/year).
BW	Body weight (kg).
CSF	Cancer slope factor for oral (CSF_o) or dermal (adjusted to an absorbed dose, CSF_a) exposure (kg-day/mg; inverse of mg/kg/day).
Dei	Effective diffusivity (cm^2/sec).
Di	Diffusivity in air (cm^2/sec).
EF	Exposure frequency (days/year).
ELCR	Excess lifetime cancer risk (unitless).
EPCs	Exposure point concentration in soil (arithmetic average) (mg/kg).
EP	Exposure period (years).
ET	Exposure time (hours/day).
F_X	Function of Ut/Um (0.000152) (unitless); $F_X = 0.18 \times [8x^3 + 12x] \times \exp[-(x^2)]$, where $x = 0.886 \times (Ut/Um)$.
Foc	Fraction organic carbon in soil (0.02).
G	Fraction of vegetative cover (unitless); conservatively assumed as zero.
H	Henry's Law Constant (atm-m^3/mol).
HI	Hazard index (unitless); sum of the HQs.
HQ	Hazard quotient (unitless).
IR_S	Ingestion rate of soil (mg/day).
Kas	Soil-air partition coefficient (g soil/cm^3 air).
Kd	Soil-water partition coefficient (cm^3/g or mL/g). Kd is calculated as Foc × Koc for organics.
Koc	Organic carbon partition coefficient (cm^3/g or mL/g); average of range in Table 5-20.
Pa	Air-filled soil porosity (0.20) (unitless).
PEF	Particulate emission factor (m^3/kg).
Pt	Total soil porosity (0.35) (unitless).
ρs	True soil or particle density (2.65 g/cm^3).
Q/C	Emission flux per unit concentration (75.0 g/m^2/sec)/(kg/m^3) (USEPA, 1996c).
RfC	Subchronic reference concentration for inhalation exposure (mg/m^3).
RfD	Subchronic reference dose for oral (RfD_o) or dermal (adjusted to an absorbed dose, RfD_a) intake (mg/kg/day).
RPF	Respirable particle fraction (0.036 g/m^2/hr) (USEPA, 1991a).
RT	Product of the ideal gas constant (8.206×10^{-5} atm-m^3/mol/K) and the Kelvin temperature (298 K at 25 °C) = 0.02445 atm-m^3/mol.
SAR	Soil adherence rate (1 mg/cm^2/day).
SSA	Exposed skin surface area (cm^2).
T	Exposure interval (7.9×10^8 sec).
UC_1	Unit conversion #1 (10^6 mg/kg).
UC_2	Unit conversion #2 (24 hours/day).
UC_3	Unit conversion #3 (0.001 mg/µg).
UC_4	Unit conversion #4 (0.0001 m^2/cm^2).
Um	Wind speed (3.13 m/sec).
UR_i	Unit cancer risk for inhalation exposure (m^3/µg).
Ut	Equivalent threshold value of windspeed at 10 meters (12.8 m/sec).
VF	Volatilization factor (m^3/kg).

TABLE 5-22
Risk Equations for Worker Exposure to Sludge, Surficial and Subsurface Soil
Land Disposal Areas RFI
Sloss Industries Corporation

SAMPLE CALCULATION: Benzo(a)pyrene, Site Worker, SWMU 24 Surface Soil.

$$x = 0.886 \times \left[(12.8 \text{ m/sec}) / (3.13 \text{ m/sec}) \right] = 3.62$$

$$F_x = 0.18 \times \left[(8 \times 3.62^3) + (12 \times 3.62) \right] \times \exp\left[-(3.62^2) \right] = 0.000152$$

$$PEF = \left[\frac{75.0 \text{ g/m}^2\text{/sec}}{\text{kg/m}^3} \right] \times \frac{(3{,}600 \text{ sec/hr})}{(0.036 \text{ g/m}^2\text{/hr}) \times (1-0) \times [(3.13 \text{ m/sec})/(12.8 \text{ m/sec})]^3 \times (0.000152)}$$
$$= 3.38 \times 10^{12} \text{ m}^3\text{/kg}$$

$$Kas = \frac{(2.40 \times 10^{-6} \text{ atm} - \text{m}^3\text{/mol})}{(0.02445 \text{ atm} \cdot \text{m}^3\text{/mol}) \times (1{,}149{,}000 \text{ cm}^3\text{/g}) \times (0.02)} = 4.27 \times 10^{-9} \text{ g/cm}^3$$

$$Dei = (0.04653 \text{ cm}^2\text{/sec}) \times [(0.20)^{3.33} / (0.35)^2] = 0.001787 \text{ cm}^2\text{/sec}$$

$$\alpha = \frac{(0.001787 \text{ cm}^2\text{/sec}) \times 0.20}{0.20 + [(2.65 \text{ g/cm}^3) \times (1-0.20) / (4.27 \times 10^{-9} \text{ g/cm}^3)]} = 7.20 \times 10^{-13} \text{cm}^2\text{/sec}$$

$$VF = \frac{75.0 \text{ g/m}^2\text{/sec}}{\text{kg/m}^3} \times \frac{[3.1416 \times (7.20 \times 10^{-13} \text{cm}^2\text{/sec}) \times (7.9 \times 10^8 \text{sec})]^{1/2}}{2 \times (0.001787 \text{ cm}^2\text{/sec}) \times 0.20 \times (4.27 \times 10^{-9} \text{ g/cm}^3)} \times (10^{-4} \text{m}^2\text{/cm}^2)$$
$$= 1.03 \times 10^8 \text{ m}^3\text{/kg}$$

Cancer Risk:

$$ELCR_o = \frac{(6.9 \text{ mg/kg}) \times (50 \text{ mg/day}) \times (250 \text{ days/yr}) \times (25 \text{ yrs})}{(10^6 \text{ mg/kg}) \times (70 \text{ kg}) \times (25{,}550 \text{ days}) \times 1/(7.3 \text{ kg} \cdot \text{day/mg})}$$
$$= 8.8 \times 10^{-6}$$

$$ELCR_d = \frac{(6.9 \text{ mg/kg}) \times (3{,}160 \text{ cm}^2) \times (1 \text{ mg/cm}^2\text{/day}) \times (0.03) \times (250 \text{ days/yr}) \times (25 \text{ yrs})}{(10^6 \text{ mg/kg}) \times (70 \text{ kg}) \times (25{,}550 \text{ days}) \times 1/(8.6 \text{ kg} \cdot \text{day/mg})}$$
$$= 2.0 \times 10^{-5}$$

TABLE 5-22
Risk Equations for Worker Exposure to Sludge, Surficial and Subsurface Soil
Land Disposal Areas RFI
Sloss Industries Corporation

$$\mathrm{ELCR_i} = \frac{(6.9\ \mathrm{mg/kg}) \times [(1/1.03 \times 10^8\ \mathrm{m^3/kg}) + (1/3.38 \times 10^{12}\ \mathrm{m^3/kg})] \times (8\ \mathrm{hr/day}) \times (250\ \mathrm{days/yr}) \times (25\ \mathrm{yrs})}{(24\ \mathrm{hr/day}) \times (25{,}550\ \mathrm{days}) \times [(0.001\ \mathrm{mg/\mu g})/(8.8 \times 10^{-4}\ \mathrm{m^3/\mu g})]}$$

$$= 4.9 \times 10^{-9}$$

$$\mathrm{ELCR} = (8.8 \times 10^{-6}) + (2.0 \times 10^{-5}) + (4.9 \times 10^{-9}) = 2.8 \times 10^{-5}$$

Non-Cancer Risk:

$$\mathrm{HQ_o} = \frac{(6.9\ \mathrm{mg/kg}) \times (50\ \mathrm{mg/day}) \times (250\ \mathrm{days/yr}) \times (25\mathrm{yrs})}{(10^6\ \mathrm{mg/kg}) \times (70\ \mathrm{kg}) \times (9{,}125\ \mathrm{days}) \times (3.0 \times 10^{-2}\ \mathrm{mg/kg/day})}$$

$$= 1.1 \times 10^{-4}$$

$$\mathrm{HQ_d} = \frac{(6.9\ \mathrm{mg/kg}) \times (3{,}160\ \mathrm{cm^2}) \times (1\ \mathrm{mg/cm^2/day}) \times (0.03) \times (250\ \mathrm{days/yr}) \times (25\ \mathrm{yrs})}{(10^6\ \mathrm{mg/kg}) \times (70\ \mathrm{kg}) \times (9{,}125\ \mathrm{days}) \times (2.6 \times 10^{-2}\ \mathrm{mg/kg/day})}$$

$$= 2.5 \times 10^{-4}$$

$$\mathrm{HQ_i} = \frac{(6.9\ \mathrm{mg/kg}) \times [(1/1.03 \times 10^8\ \mathrm{m^3/kg}) + (1/3.38 \times 10^{12}\ \mathrm{m^3/kg})] \times (8\ \mathrm{hrs/day}) \times (250\ \mathrm{days/yr}) \times (25\ \mathrm{yrs})}{(24\ \mathrm{hrs/day}) \times (9{,}125\ \mathrm{days}) \times \mathrm{NA}}$$

$$= \mathrm{NA}$$

$$\mathrm{HI} = (1.1 \times 10^{-4}) + (2.5 \times 10^{-4}) + \mathrm{NA} = 3.6 \times 10^{-4} = 0.00036$$

TABLE 5-23
Risk Calculations for Site Worker Exposure to Sludge Waste for SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	EPCs (mg/kg)	CANCER RISK Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk	NON-CANCER RISK Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk
PAHs									
Benzo(a)anthracene	45 *	2.8E-07	6.2E-07	6.2E-11	8.9E-07	3.5E-05	7.7E-05	NA	0.00011
Benzo(b)fluoranthene	57 *	3.5E-07	7.8E-07	1.5E-10	1.1E-06	4.5E-05	9.8E-05	NA	0.00014
Benzo(k)fluoranthene	27 *	1.7E-08	3.7E-08	2.3E-11	5.3E-08	2.1E-05	4.6E-05	NA	0.000067
Benzo(a)pyrene	47 *	2.9E-06	6.4E-06	4.0E-10	9.3E-06	3.7E-05	8.0E-05	NA	0.00012
Chrysene	39 *	2.4E-09	5.3E-09	2.6E-13	7.7E-09	3.1E-05	6.7E-05	NA	0.000097
Dibenzo(a,h)anthracene	3.2 *	2.0E-07	4.4E-07	2.1E-12	6.3E-07	2.5E-06	5.5E-06	NA	0.0000080
Indeno(1,2,3-cd)pyrene	39 *	2.4E-07	5.3E-07	9.7E-13	7.7E-07	3.1E-05	6.7E-05	NA	0.000097
Inorganics									
Arsenic	42 *	5.3E-07	3.6E-08	5.1E-11	5.6E-07	3.3E-03	2.1E-04	NA	0.0035
Chromium	190 *	NAP	NAP	6.4E-10	6.4E-10	8.9E-04	2.8E-03	NA	0.0037
Mercury	8.6 *	NC	NC	NC	NC	NA	NA	2.3E-08	2.3E-08
Nickel	270 *	NC	NC	1.8E-11	1.8E-11	3.2E-04	1.1E-03	NA	0.0014
Selenium	150 *	NC	NC	NC	NC	7.0E-04	4.5E-05	NA	0.00075
				TOTAL ELCR	1E-05			TOTAL HI	0.01

*	EPC is equal to the maximum detected concentration.
ELCR	Excess lifetime cancer risk.
EPCs	Exposure point concentration in sludge waste (Table 5-2) (mg/kg).
HI	Hazard index.
mg/kg	Milligrams per kilogram.
NA	Not available.
NAP	Not applicable.
NC	Not a suspected carcinogen.
PAHs	Polycyclic aromatic hydrocarbons.

j:\proj\tf320\landdisp\rpt\table\5-23site.xls
1:35 PM 1/12/98

TABLE 5-24
Risk Calculations for Construction Worker Exposure to Subsurface Soil for SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	EPCs (mg/kg)	CANCER RISK Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk	NON-CANCER RISK Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk
Inorganics									
Arsenic	22	8.0E-07	5.6E-09	3.2E-11	8.0E-07	1.2E-01	8.4E-04	NA	0.12
				TOTAL ELCR	8E-07			TOTAL HI	0.1

ELCR Excess lifetime cancer risk.
EPCs Exposure point concentration in subsurface soil (Table 5-1) (mg/kg).
HI Hazard index.
mg/kg Milligrams per kilogram.
NA Not available.

TABLE 5-25
Risk Calculations for Site Worker Exposure to Surficial Soil for SWMU 24
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	EPCs (mg/kg)	CANCER RISK: Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk	NON-CANCER RISK: Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk
PAHs									
Benzo(a)anthracene	16	2.0E-06	4.6E-06	1.8E-09	6.6E-06	2.6E-04	5.7E-04	NA	0.00083
Benzo(b)fluoranthene	7.2	9.2E-07	2.1E-06	1.6E-09	3.0E-06	1.2E-04	2.6E-04	NA	0.00037
Benzo(k)fluoranthene	3.1	4.0E-08	8.8E-08	2.2E-10	1.3E-07	5.1E-05	1.1E-04	NA	0.00016
Benzo(a)pyrene	6.9	8.8E-06	2.0E-05	4.9E-09	2.8E-05	1.1E-04	2.5E-04	NA	0.00036
Chrysene	7.0	8.9E-09	2.0E-08	3.9E-12	2.9E-08	1.1E-04	2.5E-04	NA	0.00036
Dibenzo(a,h)anthracene	0.31	4.0E-07	8.8E-07	1.7E-11	1.3E-06	5.1E-06	1.1E-05	NA	0.000016
Indeno(1,2,3-cd)pyrene	5.7	7.3E-07	1.6E-06	1.2E-11	2.4E-06	9.3E-05	2.0E-04	NA	0.00030
Inorganics									
Antimony	5.2	NC	NC	NC	NC	6.4E-03	4.0E-02	NA	0.047
Beryllium	1.2	9.0E-07	NAP	6.8E-11	9.0E-07	1.2E-04	NAP	NA	0.00012
Cadmium	6.2	NAP	NAP	2.6E-10	2.6E-10	3.0E-03	1.7E-01	NA	0.176
Chromium	59	NAP	NAP	1.7E-08	1.7E-08	5.8E-03	1.8E-02	NA	0.024
				TOTAL ELCR	4E-05			TOTAL HI	0.2

ELCR Excess lifetime cancer risk.
EPCs Exposure point concentration in surface soil (Table 5-3) (mg/kg).
HI Hazard index.
mg/kg Milligrams per kilogram.
NA Not available.
NAP Not applicable.
PAHs Polycyclic aromatic hydrocarbons.

240

TABLE 5-26
Risk Calculations for Site Worker Exposure to Sludge for SWMU 24
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	EPCs (mg/kg)	CANCER RISK Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk	NON-CANCER RISK Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk
Inorganics									
Antimony	18 *	NC	NC	NC	NC	2.2E-02	1.4E-01	NA	0.16
Beryllium	3.1 *	2.3E-06	NAP	1.7E-10	2.3E-06	3.0E-04	NAP	NA	0.00030
Cadmium	11 *	NAP	NAP	4.6E-10	4.6E-10	5.4E-03	3.1E-01	NA	0.31
Chromium	180 *	NAP	NAP	5.1E-08	5.1E-08	1.8E-02	5.6E-02	NA	0.073
Lead	1,700 *	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	4,500 *	NC	NC	NC	NC	7.3E-03	1.5E-03	NA	0.0089
				TOTAL ELCR	2E-06			TOTAL HI	0.6

*	EPC is equal to the maximum detected concentration.
ELCR	Excess lifetime cancer risk.
EPCs	Exposure point concentration in sludge waste (Table 5-4) (mg/kg).
HI	Hazard index.
mg/kg	Milligrams per kilogram.
NA	Not available.
NAP	Not applicable.
NC	Not a suspected carcinogen.

TABLE 5-27
Risk Calculations for Site Worker Exposure to Sludge for SWMU 39
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	EPCs (mg/kg)	CANCER RISK Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk	NON-CANCER RISK Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk
Inorganics									
Antimony	15 *	NC	NC	NC	NC	1.8E-02	1.2E-01	NA	0.13
Beryllium	2.3 *	1.7E-06	NAP	1.3E-10	1.7E-06	2.3E-04	NAP	NA	0.00023
Cadmium	12 *	NAP	NAP	5.1E-10	5.1E-10	5.9E-03	3.3E-01	NA	0.34
Zinc	3,100 *	NC	NC	NC	NC	5.1E-03	1.1E-03	NA	0.0061
				TOTAL ELCR	**2E-06**			**TOTAL HI**	**0.5**

* EPC is equal to the maximum detected concentration.
ELCR Excess lifetime cancer risk.
EPCs Exposure point concentration in sludge waste (Table 5-6) (mg/kg).
HI Hazard index.
mg/kg Milligrams per kilogram.
NA Not available.
NAP Not applicable.
NC Not a suspected carcinogen.

TABLE 5-28
Risk Calculations for Construction Worker Exposure to Subsurface Soil for SWMUs 38 and 39
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	EPCs (mg/kg)	CANCER RISK Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk	NON-CANCER RISK Route-Specific Risks Oral	Dermal	Inhalation	Calculated Risk
Inorganics									
Beryllium	0.74	7.7E-08	NAP	6.0E-13	7.7E-08	2.5E-04	NAP	NA	0.00025
				TOTAL ELCR	**8E-08**			**TOTAL HI**	**0.0003**

ELCR Excess lifetime cancer risk.
EPCs Exposure point concentration in subsurface soil (Table 5-5) (mg/kg).
HI Hazard index.
mg/kg Milligrams per kilogram.
NA Not available.
NAP Not applicable.

243

j:\proj\tf320\landdisp\rpt\table\5-28cons.xls
1:34 PM 1/12/98

ARCADIS GERAGHTY & MILLER

TABLE 5-29
Remedial Goal Option Equations for Soil or Sludge Exposure
Land Disposal Areas RFI
Sloss Industries Corporation

ROUTE-SPECIFIC RGOs:

Oral:

$$(RGO_o)_C = \frac{TCR \times BW \times AT_C \times (10^6 \, mg/kg)}{IR_S \times EF \times ED \times CSF_o}$$

Dermal:

$$(RGO_d)_C = \frac{TCR \times BW \times AT_C \times (10^6 \, mg/kg)}{SSA \times SAR \times ABS_d \times EF \times ED \times CSF_a}$$

Inhalation:

$$(RGO_i)_C = \frac{TCR \times (24 \, hr/day) \times AT_C}{\left[(1/VF) + (1/PEF)\right] \times ET \times EF \times ED \times \left(UR_i / 0.001 \frac{mg}{\mu g}\right)}$$

where:

$$VF = Q/C \times \frac{(3.1416 \times \alpha \times T)^{1/2}}{2 \times Dei \times Pa \times Kas} \times 10^{-4} \, m^2/cm^2$$

$$PEF = Q/C \times \frac{3{,}600 \, sec/hr}{RPF \times (1 - G) \times (Um/Ut)^3 \times F_X}$$

$$\alpha = \frac{Dei \times Pa}{Pa + [\rho s \times (1 - Pa)/Kas]}$$

$$Dei = Di \times (Pa^{3.33}/Pt^2)$$

$$Kas = H/(RT \times Kd)$$

CANCER EFFECTS RGO:

$$RGO_C = \frac{1}{\frac{1}{(RGO_o)_C} + \frac{1}{(RGO_d)_C} + \frac{1}{(RGO_i)_C}}$$

TABLE 5-29
Remedial Goal Option Equations for Soil or Sludge Exposure
Land Disposal Areas RFI
Sloss Industries Corporation

where:

α	Alpha; calculation intermediate (cm^2/sec).
ABS_d	Dermal absorption efficiency (unitless), constituent specific.
AT_C	Averaging time for cancer effects (years).
BW	Body weight (kg).
CSF	Cancer slope factor for oral (CSF_o) or dermal (adjusted to an absorbed dose, CSF_a) exposure (kg-day/mg; inverse of mg/kg/day).
Dei	Effective diffusivity (cm^2/sec).
Di	Diffusivity in air (cm^2/sec); constituent specific.
ED	Exposure duration (years).
EF	Exposure frequency (days/year).
ET	Exposure time (hr/day).
Foc	Fraction organic carbon in soil (unitless) (0.02).
F_X	Function of Ut/Um (unitless) (0.000152); $F_X = 0.18 \times [\, 8x^3 + 12x \,] \times \exp(-x^2)$, where $x = 0.886 \times (Ut/Um)$.
G	Fraction of vegetative cover (unitless); conservatively assumed as zero.
H	Henry's Law Constant (atm-m^3/mol); constituent specific.
IR_S	Incidental soil ingestion rate (mg/day).
Kas	Soil-air partition coefficient (g soil/cm^3 air).
Kd	Soil-water partition coefficient (cm^3/g or mL/g); constituent specific. Kd is calculated as Foc × Koc.
Koc	Organic carbon partition coefficient (cm^3/g or mL/g); constituent specific.
Pa	Air-filled soil porosity (0.20, unitless).
PEF	Particulate emission factor (m^3/kg).
Pt	Total soil porosity (0.35, unitless).
Q/C	Emission flux per unit concentration (g/m^2/sec)/(kg/m^3).
ρs	True soil or particle density (2.65 g/cm^3).
RGO	Remedial goal options for soil (mg/kg); which are based on the route-specific RGOs (RGO_o for the oral route, RGO_d for the dermal route, and RGO_i for the inhalation route).
RPF	Respirable particle fraction (0.036 g/m^2/hr).
RT	Product of the ideal gas constant (8.206×10^{-5} atm-m^3/mol/K) and the Kelvin temperature (298 K at 25 °C) = 0.02445 atm-m^3/mol.
SAR	Skin adherence rate (1 mg/cm^2/day).
SSA	Exposed skin surface area (cm^2).
T	Exposure interval (7.9E+08 sec).
TCR	Target cancer risk (unitless).
Um	Wind speed, annual average (3.13 m/sec).
UR_i	Unit cancer risk for inhalation exposure ($m^3/\mu g$).
Ut	Equivalent threshold value of windspeed at 10 meters (12.8 m/sec).
VF	Volatilization factor (m^3/kg).

SAMPLE CALCULATION: Benzo(a)pyrene exposure based on TCR = 10^{-6}.

$$\text{Kas} = \frac{2.4\times10^{-6}\,\text{atm}\cdot\text{m}^3/\text{mol}}{0.02445\ \text{atm}\cdot\text{m}^3/\text{mol} \times 0.02 \times 1{,}149{,}000\ \text{cm}^3/\text{g}} = 4.27\times10^{-9}\ \text{g}/\text{cm}^3$$

TABLE 5-29
Remedial Goal Option Equations for Soil or Sludge Exposure
Land Disposal Areas RFI
Sloss Industries Corporation

$$\text{Dei} = 0.04653\ \text{cm}^2/\text{sec} \times (0.2^{3.33}/0.35^2) = 0.00179\ \text{cm}^2/\text{sec}$$

$$\alpha = \frac{0.00179\ \text{cm}^2/\text{sec} \times 0.2}{0.2 + [2.65\ \text{g/cm}^3\ (1-0.2)/4.27 \times 10^{-9}\ \text{g/cm}^3]} = 7.2 \times 10^{-13}\ \text{cm}^2/\text{sec}$$

$$\text{PEF} = 75.0\,(\text{g/m}^2/\text{sec})/(\text{kg/m}^3) \times \frac{3{,}600\ \text{sec/hr}}{0.036\ \text{g/m}^2/\text{hr} \times (1-0) \times (3.13\ \text{m/sec} / 12.8\ \text{m/sec})^3 \times 0.000152} = 3.38 \times 10^{12}\ \text{m}^3/\text{kg}$$

$$\text{VF} = 75.0\,(\text{g/m}^2/\text{sec})/(\text{kg/m}^3) \times \frac{[3.1416 \times (7.2 \times 10^{-13}\ \text{cm}^2/\text{sec}) \times (7.9 \times 10^8\ \text{sec})]^{1/2}}{2 \times 0.00179 \times 0.2 \times (4.27 \times 10^{-9}\ \text{g/cm}^3)} = 1.04 \times 10^8\ \text{m}^3/\text{kg}$$

$$\text{RGO}_O = \frac{(1 \times 10^{-6}) \times 70\ \text{kg} \times 25{,}550\ \text{days} \times 10^6\ \text{mg/kg}}{50\ \text{mg/day} \times 250\ \text{days/yr} \times 25\ \text{yrs} \times 7.3\ \text{kg}\cdot\text{day/mg}} = 0.78\ \text{mg/kg}$$

$$\text{RGO}_d = \frac{(1 \times 10^{-6}) \times 70\ \text{kg} \times 25{,}550\ \text{days} \times 10^6\ \text{mg/kg}}{3{,}160\ \text{cm}^2 \times 1\ \text{mg/cm}^2/\text{day} \times 0.03 \times 250\ \text{days/yr} \times 25\ \text{yrs} \times 8.6\ \text{kg}\cdot\text{day/mg}} = 0.35\ \text{mg/kg}$$

$$\text{RGO}_i = \frac{(1 \times 10^{-6}) \times 24\ \text{hr/day} \times 25{,}550\ \text{days}}{\left[\left(\frac{1}{1.04 \times 10^8\ \text{m}^3/\text{kg}}\right) + \left(\frac{1}{3.38 \times 10^{12}\ \text{m}^3/\text{kg}}\right)\right] \times 8\ \text{hrs/day} \times 250\ \text{days/yrs} \times 25\ \text{yrs} \times \left(\frac{8.8 \times 10^{-4}\ \text{m}^3/\text{kg}}{0.001\ \text{mg}/\mu\text{g}}\right)}$$

$$= 1.4 \times 10^3\ \text{mg/kg}$$

$$\text{RGO}_C = \frac{1}{\frac{1}{0.78\ \text{mg/kg}} + \frac{1}{0.35\ \text{mg/kg}} + \frac{1}{1.4 \times 10^3\ \text{mg/kg}}} = 0.24\ \text{mg/kg}$$

TABLE 5-30
Remedial Goal Option Concentrations for SWMU 23 Sludge
Based on Site Worker Exposure
Land Disposal Areas RFI
Sloss Industries Corporation

	CANCER EFFECTS			
	Target Cancer Risk Concentration at:			EPC
Constituent	10^{-4}	10^{-5}	10^{-6}	(mg/kg)
PAHs				
Benzo(a)anthracene	5.1E+03	5.1E+02	5.1E+01	45
Benzo(b)fluoranthene	5.1E+03	5.1E+02	5.1E+01	57
Benzo(k)fluoranthene	5.0E+04	5.0E+03	5.0E+02	27
Benzo(a)pyrene	5.1E+02	5.1E+01	5.1E+00	47
Chrysene	5.1E+05	5.1E+04	5.1E+03	39
Dibenzo(a,h)anthracene	5.1E+02	5.1E+01	5.1E+00	3.2
Indeno(1,2,3-c,d)pyrene	5.1E+03	5.1E+02	5.1E+01	39
Metals				
Arsenic	7.4E+03	7.4E+02	7.4E+01	42
Chromium*	2.9E+10	2.9E+09	2.9E+08	190
Mercury	NC	NC	NC	8.6
Nickel	1.4E+12	1.4E+11	1.4E+10	270
Selenium	NC	NC	NC	150

*	Values for chromium based on chromium VI.
(shaded)	EPC exceeds concentration at target risk level.
EPC	Exposure point concentration (Table 5-2).
mg/kg	Milligrams per kilogram.
NC	Not evaluated as a carcinogen.
PAHs	Polycyclic aromatic hydrocarbons.

TABLE 5-31
Remedial Goal Option Concentrations for SWMUs 24 and 39 Surficial Soil and Sludge
Based on Site Worker Exposure
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	CANCER EFFECTS Target Cancer Risk Concentrations at: 10^{-4}	10^{-5}	10^{-6}	EPC SWMU 24* (mg/kg)	EPC SWMU 39**
PAHs					
Benzo(a)anthracene	2.4E+02	2.4E+01	2.4E+00	16 / -	NAP
Benzo(b)fluoranthene	2.4E+02	2.4E+01	2.4E+00	7.2 / -	NAP
Benzo(k)fluoranthene	2.4E+03	2.4E+02	2.4E+01	3.1 / -	NAP
Benzo(a)pyrene	2.4E+01	2.4E+00	2.4E-01	6.9 / -	NAP
Chrysene	2.4E+04	2.4E+03	2.4E+02	7 / -	NAP
Dibenzo(a,h)anthracene	2.4E+01	2.4E+00	2.4E-01	0.31 / -	NAP
Indeno(1,2,3-c,d)pyrene	2.4E+02	2.4E+01	2.4E+00	5.7 / -	NAP
Metals					
Antimony	NC	NC	NC	5.2 / 18	15
Beryllium	1.3E+02	1.3E+01	1.3E+00	1.2 / 3.1	2.3
Cadmium	2.3E+09	2.3E+08	2.3E+07	6.2 / 11	12
Chromium***	3.5E+08	3.5E+07	3.5E+06	59 / 180	NAP
Lead	NA	NA	NA	- / 1,700	NAP
Zinc	NC	NC	NC	- / 4,500	3,100

*	EPC for surficial soil/sludge waste (Tables 5-3 / 5-4).
**	EPC for sludge waste only (Table 5-6).
***	Values for chromium based on chromium VI.
(shaded)	EPC exceeds concentration at target risk level.
EPC	Exposure point concentration (Tables 5-3, 5-4, and 5-6).
mg/kg	Milligrams per kilogram.
NA	Not available.
NAP	Not applicable.
NC	Not evaluated as a carcinogen.
PAHs	Polycyclic aromatic hydrocarbons.

TABLE 5-32
Risk-Based Remedial Goal Option for Site Worker Exposure to Lead in SWMU 24 Sludge Land Disposal Areas RFI
Sloss Industries Corporation

$$RGO_{lead} = \frac{\left(PbB_{adult,central,goal} - PbB_{adult,0}\right) \times AT}{BKSF \times IR_S \times AF_S \times EF_S}$$

where:

$$PbB_{adult,central,goal} = \frac{PbB_{fetal,0.95,goal}}{GSD_{i,adult}^{1.645} \times R_{fetal/maternal}}$$

where:

AF_s	Absolute gastrointestinal absorption fraction (0.12).
AT	Averaging time (365 days/year).
BKSF	Biokinetic slope factor (0.4 µg/dL per µg/day).
EF_s	Exposure frequency (250 days/year).
$GSD_{i,adult}$	Geometric standard deviation (1.8).
IR_s	Ingestion rate for soil (0.05 g/day).
$PbB_{adult,o}$	Typical blood lead concentration in adults in the absence of site exposures (2 µg/dL).
$PbB_{adult,central,goal}$	Goal for central blood lead concentrations that have site exposures (µg/dL).
$PbB_{fetal,0.95,goal}$	Goal for the 95th percentile blood lead concentrations among fetuses born to woman having exposures to site soils (10 µg/dL).
$R_{fetal/maternal}$	Constant of proportionality between fetal blood lead concentration at birth and maternal blood lead concentration (0.9).
RGO_{lead}	Risk-based remedial goal option for lead in soil (mg/kg).

Sample Calculation

$$PbB_{adult,central,goal} = \frac{10\ \mu g/dL}{1.8^{1.645} \times 0.9}$$
$$= 4.23\ \mu g/dL$$

$$RGO_{lead} = \frac{\left(4.23\ \mu g/dL - 2\ \mu g/dL\right) \times 365\ days/year}{0.4\ \frac{\mu g/dL}{\mu g/day} \times 0.05\ g/day \times 0.12 \times 250\ days/year} \times (1{,}000\ g/kg) \times (0.001\ mg/\mu g)$$

$$= 1{,}400\ mg/kg$$

TABLE 5-33
Input Probability Distribution Functions for Monte Carlo Simulation Random Variables
Land Disposal Areas RFI
Sloss Industries Corporation

Random Variable	Input Probability Distribution Function	Reference
BW	CUSTOM (min-51; 5%-58.6; 10%-62.3; 15%-64.9; 25%-68.7; 50%-76.9; 75%-85.6; 85%-91.3; 90%-95.7;95%-102.7; max-107); correlated with SSA (0.6)	[a (min, max); b(percentiles)]
EF	SWMU 23: UNIFORM (min-2, max-12)	PJ
	Other SWMUs: TRIANGULAR (min-130, likeliest-240, max-255)	PJ, based on [c]
EP	CUSTOM (min-0; 25%-1; 50%-3.8; 75%-11; 90%-19; 95%-25; max-30)	[a]
EPC	CUSTOM (measured concentration data)	
	SWMU 24, Surface Soil:	[d]
	Benzo(a)anthracene: LOGNORMAL (mean-2.67, StdDev- 9.09)	
	Benzo(a)pyrene: LOGNORMAL (mean-1.658, StdDev- 4.082)	
	Dibenzo(a,h)anthracene: LOGNORMAL (mean-0.40, StdDev- 0.38)	
	Indeno(1,2,3-cd)pyrene: LOGNORMAL (mean-1.44, StdDev- 3.38)	
ET	SWMU 23: UNIFORM (min-0.5, max-2)	PJ
	Other SWMUs: TRIANGULAR (min-0, likeliest-8, max-9)	PJ
IR_S	CUSTOM (min-0, max-216; 67%-17; 83%-148) × 0.5 = CUSTOM (min-0, max-108; 67%-8.5; 83%-74)	[a]
SAR	NORMAL (mean-0.03, SD-0.003)	[b,e]
SSA	NORMAL (mean-2460, SD-240); correlated with BW (0.6)	[b]

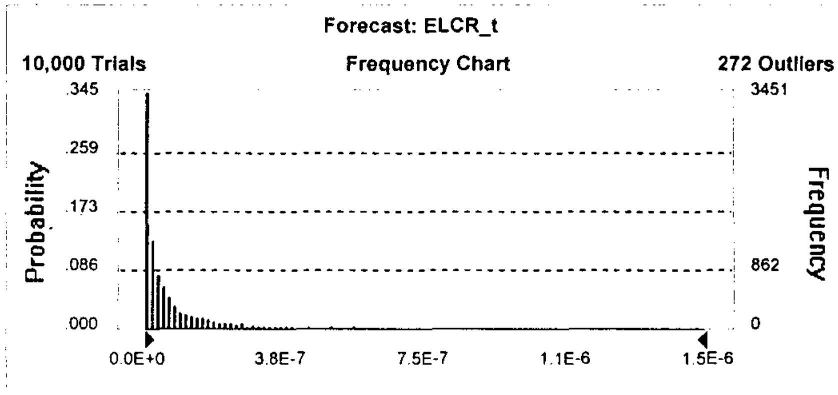
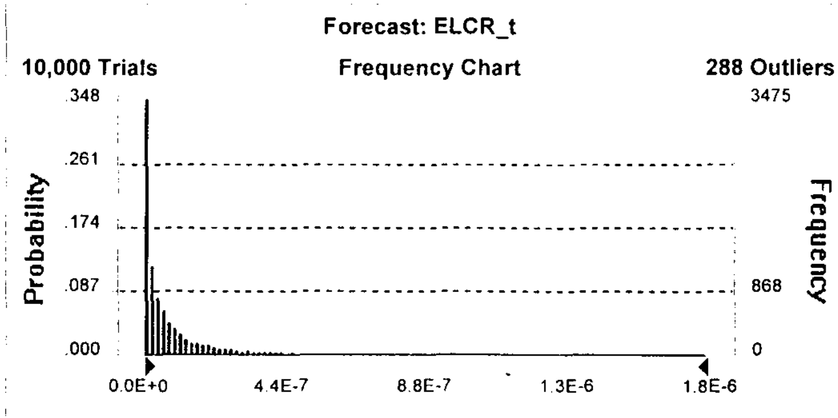
References

PJ	Professional judgment.
[a]	AIHC (1994).
[b]	USEPA (1995).
[c]	Residential distribution (Smith, 1994), modified to correspond to site worker exposure.
[d]	Lognormal distributions based on analytical data; derived using Crystal Ball 4.0® software.
[e]	Kissel, et al. (1996).

Definitions

BW	Body weight (kilograms).
EF	Exposure frequency (days/year).
EPC	Exposure point concentration (mg/kg).
EP	Exposure period (years).
ET	Exposure time per day (hours/day).
IR_S	Ingestion rate of soil (mg/day).
SAR	Soil adherence rate ($mg/cm^2/day$).
SSA	Exposed skin surface area (cm^2).
StdDev	Standard deviation.

TABLE 5-34
Results of Monte Carlo Simulation of Total Cancer Risk for Site Worker Exposure
Land Disposal Areas RFI
Sloss Industries Corporation

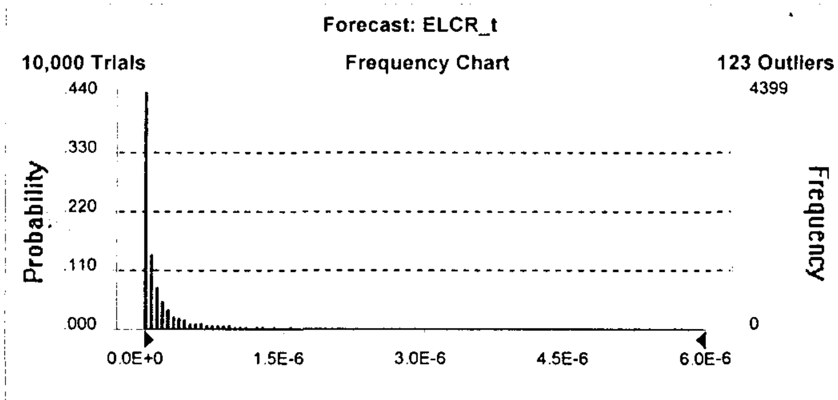
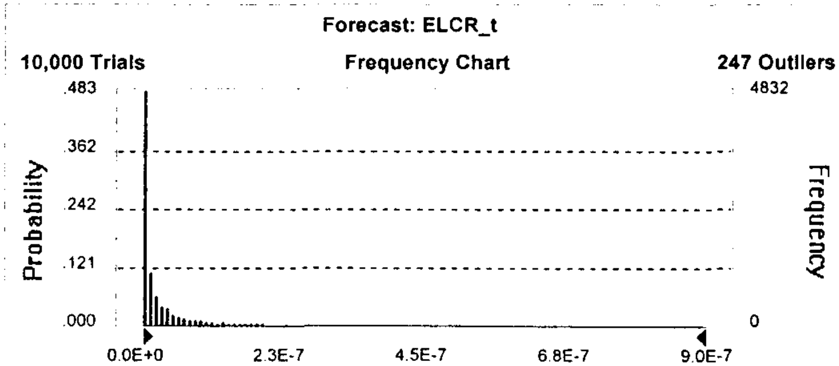
Exposure Scenario	Cancer Risk (Total ELCR) Median	Mean	95% *	Output Probability Distribution for Total ELCR
SWMU 23 Sludge Waste	3E-08	2E-07	9E-07	
SWMU 24 Sludge Waste	4E-08	2E-07	1E-06	

Footnotes appear on page 2.

j:\proj\tf320\landdisp\rpt\table\5-34risk.xls
1:36 PM 1/12/98

ARCADIS GERAGHTY & MILLER

TABLE 5-34
Results of Monte Carlo Simulation of Total Cancer Risk for Site Worker Exposure
Land Disposal Areas RFI
Sloss Industries Corporation

Exposure Scenario	Cancer Risk (Total ELCR) Median	Mean	95% *	Output Probability Distribution for Total ELCR
SWMU 24 Surficial Soil	8E-08	5E-07	2E-06	
SWMUs 38 & 39 Sludge Waste	1E-08	9E-08	4E-07	

* 95th percentiles of the predicted risk probability distributions.

ELCR Excess lifetime cancer risk.

252

j:\proj\tf320\landdisp\rpt\table\5-34risk.xls
1:36 PM 1/12/98

ARCADIS GERAGHTY&MILLER

TABLE 5-35
Selection of Constituents of Ecological Concern in Subsurface Soil for SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Maximum Concentration	Background Concentration	ORNL Ecological Soil PRG	COEC Basis
VOCs (µg/kg)				
Acetone	110	NAP	NA	YES/A
Inorganics (mg/kg)				
Arsenic	30	11	2.66	YES/B,C
Barium	180	52	208	no/D
Beryllium	0.70	0.58	10	no/D,E
Cadmium	2.5	NAP	3	no/D
Chromium	19	30	0.4	no/E
Copper	22	8.3	50	no/D
Cyanide	0.43	NAP	NA	YES/A
Lead	19	12	50	no/D,E
Nickel	66	8.1	24	YES/B,C
Zinc	430	31	26	YES/B,C

A	No background or PRG value available for comparison; therefore retained as a COEC.
B	Greater than two times background value.
C	Greater than ORNL ecological soil PRG.
D	Less than ORNL ecological soil PRG.
E	Less than two times background value.
COEC	Constituent of ecological concern.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NA	Not available.
NAP	Not applicable.
ORNL	Oak Ridge National Laboratory.
PRG	Preliminary remediation goal.
VOCs	Volatile organic compounds.

TABLE 5-36
Selection of Constituents of Ecological Concern in Sludge for SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Maximum Concentration	Background Concentration	ORNL Ecological Soil PRG	COEC Basis
Carcinogenic PAHs (µg/kg)				
Benzo(a)anthracene	45,000	NAP	NA	YES/A
Benzo(b)fluoranthene	57,000	NAP	NA	YES/A
Benzo(k)fluoranthene	27,000	NAP	NA	YES/A
Benzo(a)pyrene	47,000	NAP	NA	YES/A
Chrysene	39,000	NAP	NA	YES/A
Dibenzo(a,h)anthracene	3,200	NAP	NA	YES/A
Indeno(1,2,3-cd)pyrene	39,000	NAP	NA	YES/A
Non-Carcinogenic PAHs (µg/kg)				
Acenaphthylene	11,000	NAP	NA	YES/A
Anthracene	3,800	NAP	NA	YES/A
Benzo(g,h,i)perylene	40,000	NAP	NA	YES/A
Fluoranthene	25,000	NAP	NA	YES/A
Fluorene	5,400	NAP	NA	YES/A
Naphthalene	4,100	NAP	NA	YES/A
Phenanthrene	14,000	NAP	NA	YES/A
Pyrene	31,000	NAP	NA	YES/A
VOCs (µg/kg)				
2-Butanone (MEK)	530	NAP	NA	YES/A
Acetone	1,200	NAP	NA	YES/A
Ethylbenzene	220	NAP	780,000,000	no/B
Toluene	5,100	NAP	200	no/B
Xylenes	900	NAP	NA	YES/A
Semi-VOCs (µg/kg)				
4-Methylphenol	10,000	NAP	NA	YES/A
Inorganics (mg/kg)				
Arsenic	42	11	2.66	YES/B,C
Barium	450	52	208	YES/B,C
Chromium	190	30	0.4	YES/B,C
Copper	240	8.3	50	YES/B,C
Cyanide	136	NAP	NA	YES/A
Lead	51	12	50	YES/B,C
Mercury	8.6	0.034	0.0185	YES/B,C
Nickel	270	8.1	24	YES/B,C
Selenium	150	NAP	0.79	YES/C
Silver	8.0	NAP	2	YES/C
Zinc	300	31	26	YES/B,C

Footnotes appear on page 2.

TABLE 5-36
Selection of Constituents of Ecological Concern in Sludge for SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Concentrations are reported in milligrams per kilogram (mg/kg).

A	No background or PRG value available for comparison; therefore retained as a COEC.
B	Greater than two times background value.
C	Greater than ORNL ecological soil PRG.
D	Less than ORNL ecological soil PRG.
E	Less than two times background value.
COEC	Constituent of ecological concern.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NA	Not available.
NAP	Not applicable.
ORNL	Oak Ridge National Laboratory.
PAHs	Polycyclic aromatic hydrocarbons.
PRG	Preliminary remediation goal.
VOCs	Volatile organic compounds.

TABLE 5-37
Selection of Constituents of Ecological Concern in Subsurface Soil for SWMUs 38 and 29
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Maximum Concentration	Background Concentration	ORNL Ecological Soil PRG	COC Basis
<u>VOCs</u> (µg/kg)				
Toluene	8.0	NAP	NA	YES/A
<u>Inorganics</u> (mg/kg)				
Antimony	9.6	NAP	5	YES/C
Arsenic	5.2	11	2.66	no/E
Barium	420	52	208	YES/B,C
Beryllium	2.8	0.58	10	no/D
Chromium	19	30	0.4	no/E
Copper	110	8.3	50	YES/B,C
Cyanide	1.3	NAP	NA	YES/A
Lead	36	12	50	no/D
Nickel	32	8.1	24	YES/B,C
Silver	7.6	NAP	2	YES/C
Zinc	190	31	26.3	YES/B,C

A	No background or PRG value available for comparison; therefore retained as a COEC.
B	Greater than two times background value.
C	Greater than ORNL ecological soil PRG.
D	Less than ORNL ecological soil PRG.
E	Less than two times background value.
COEC	Constituent of ecological concern.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NA	Not available.
NAP	Not applicable.
ORNL	Oak Ridge National Laboratory.
PRG	Preliminary remediation goal.
VOCs	Volatile organic compounds.

TABLE 5-38
Selection of Constituents of Ecological Concern in Sludge for SWMU 39
Land Disposal Areas RFI
Sloss Industries Corporation

Constituents	Maximum Concentration	Background Concentration	ORNL Ecological Soil PRG	COC Basis
Carcinogenic PAHs (µg/kg)				
Benzo(k)fluoranthene	630	NAP	NA	YES/A
Inorganics (mg/kg)				
Antimony	15	NAP	5	YES/C
Arsenic	8.8	11	2.66	no/E
Barium	260	52	208	YES/B,C
Beryllium	2.3	0.58	10	no/D
Cadmium	12	NAP	3	YES/C
Copper	160	8.3	50	YES/B,C
Cyanide	8.3	NAP	NA	YES/A
Lead	320	12	50	YES/B,C
Nickel	25	8.1	24	YES/B,C
Silver	4.6	NAP	2	YES/C
Zinc	3,100	31	26.3	YES/B,C

A	No background or PRG value available for comparison; therefore retained as a COEC.
B	Greater than two times background value.
C	Greater than ORNL ecological soil PRG.
D	Less than ORNL ecological soil PRG.
E	Less than two times background value.
COEC	Constituent of ecological concern.
µg/kg	Micrograms per kilogram.
mg/kg	Milligrams per kilogram.
NA	Not available.
NAP	Not applicable.
ORNL	Oak Ridge National Laboratory.
PRG	Preliminary remediation goal.
VOCs	Volatile organic compounds.

TABLE 5-39
Toxicological Benchmark Values for Eastern Cottontail Rabbit
Land Disposal Areas RFI
Sloss Industriesl Corporation

Constituent	Test Species [a]	Experimental Value [b] (mg/kg/day)		NOAEL (mg/kg/day)	Measurement Endpoint	Reference [c]	Scaling Factor	Rabbit Toxicological Benchmark [d] (mg/kg/day)
VOCs								
2-Butanone	NA	NA		NA	NA	NA	NA	NA
Acetone	Rat	100	e	10	Reproduction	Sample et al., 1996	0.73	7.35
Toluene	Mouse	259.8	f	25.98	Reproduction	Sample et al., 1996	0.40	10.33
Xylene (mixed isomers)	Mouse	2.06	g	2.06	Reproduction	Sample et al., 1996	0.40	0.82
Semi-VOCs								
4-Methylphenol	NA	NA		NA	NA	NA	NA	NA
Acenaphthylene	NA	NA		NA	NA	NA	NA	NA
Anthracene	Mouse	1,000	e	100	No observed effects	IRIS, 1997	0.40	39.76
Benzo(a)anthracene	NA	NA		NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA		NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA		NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA		NA	NA	NA	NA	NA
Benzo(a)pyrene	Mouse	10	f	1	Reproduction	Sample et al., 1996	0.40	0.40
Chrysene	NA	NA		NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA		NA	NA	NA	0.40	NA
Fluoranthene	Mouse	125	e	12.5	Nephropathy	IRIS, 1997	0.40	4.97
Fluorene	Mouse	125	e	12.5	Decreased RBC	IRIS, 1997	0.40	4.97
Indeno(1,2,3-cd)pyrene	NA	NA		NA	NA	NA	NA	NA
Naphthalene	NA	NA		NA	NA	NA	NA	NA
Phenanthrene	NA	NA		NA	NA	NA	NA	NA
Pyrene	Mouse	75	e	7.5	Kidney Effects	IRIS, 1997	0.40	2.98
Inorganics								
Arsenic	Mouse	1.26	f	0.126	Reproduction	Sample et al., 1996	0.40	0.05
Barium (chloride)	Rat	5.1	g	5.1	Growth	Sample et al., 1996	0.73	3.75
Cadmium (soluble salt)	Rat	1	g	1	Reproduction	Sample et al., 1996	0.63	0.63
Chromium III	Rat	2,737	g	2,737	Reproduction	Sample et al., 1996	0.73	2,011.39
Chromium VI	Rat	13.14	f	1.3	Growth, food consmp	Sample et al., 1996	0.73	0.96

Footnotes on page 2.

TABLE 5-39
Toxicological Benchmark Values for Eastern Cottontail Rabbit
Land Disposal Areas RFI
Sloss Industriesl Corporation

Constituent	Test Species [a]	Experimental Value [b] (mg/kg/day)		NOAEL (mg/kg/day)	Measurement Endpoint	Reference [c]	Scaling Factor	Rabbit Toxicological Benchmark [d] (mg/kg/day)
Inorganics (cont.)								
Copper (sulfate)	Mink	11.71	g	11.71	Reproduction	Sample et al., 1996	0.96	11.19
Cyanide (K cyanide)	Rat	68.7	g	68.7	Reproduction	Sample et al., 1996	0.61	41.94
Lead (acetate)	Rat	8	g	8	Reproduction	Sample et al., 1996	0.73	5.88
Mercury (sulfide)	Mouse	13.3	g	13.3	Reproduction	Sample et al., 1996	0.40	5.29
Mercury (methyl mercury)	Rat	0.032	g	0.032	Reproduction	Sample et al., 1996	0.73	0.02
Nickel (sulfate)	Rat	40	g	40	Reproduction	Sample et al., 1996	0.73	29.40
Selenium	Rat	0.2	g	0.2	Reproduction	Sample et al., 1996	0.73	0.15
Silver	Mouse	18.1	f	1.8	Systemic	Rungby & Danscher, 1984	0.35	0.63
Zinc (oxide)	Rat	160	g	160	Reproduction	Sample et al., 1996	0.73	117.58

[a]	Species in which the experimental (literature derived) value was reported.
[b]	Daily dose reported in the literature to cause toxicity endpoint.
[c]	Reference where experimental value was found.
[d]	Toxicological benchmark value = Benchmark value x scaling factor. Scaling factor is discussed in text.
[e]	Subchronic NOAEL
[f]	Chronic LOAEL
[g]	Chronic NOAEL
[h]	Subchronic LOAEL
mg/kg/day	Milligrams per kilogram per day.
LOAEL	Lowest observed adverse effect level.
NA	Not available.
NOAEL	No observed adverse effect level.

TABLE 5-40
Soil-To-Plant Uptake Factors
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Log Kow [a]	Soil-to-Plant Uptake Factor [b]
VOCs		
Acetone	-0.24	0
2-Butanone	0.29	1.86
Ethylbenzene	3.15	0.56
Toluene	2.8	0.60
Xylene	3.2	0.56
Semi-VOCs		
4-Methylphenol	3.01	0.58
Acenaphthene	4.33	0.48
Acenapthylene	4.1	0.49
Anthracene	4.54	0.47
Benzo(a)anthracene	5.91	0.41
Benzo(a)pyrene [c]	6.5	0.39
Benzo(b)fluoranthene	6.57	0.39
Benzo(g,h,i)perylene	7.1	0.38
Benzo(k)fluoranthene	6.85	0.38
Chrysene	5.91	0.41
Dibenzo(a,h)anthracene	6.5	0.39
Fluoranthene	5.22	0.44
Fluorene	4.38	0.48
Indeno(1,2,3-cd)pyrene	7.7	0.36
Naphthalene	4.7	0.46
Phenanthrene	4.6	0.47
Pyrene	5.3	0.43
Metals		
Antimony	NA	0.20 [d]
Arsenic	NA	0.04 [d]
Barium	NA	0.15 [d]
Beryllium	NA	0.01 [d]
Cadmium	NA	0.55 [d]
Chromium III	NA	0.008 [d]
Chromium VI	NA	0.008 [d]
Copper	NA	0.40 [d]
Lead	NA	0.45 [d]
Mercury	NA	0.90 [d]
Nickel	NA	0.06 [d]
Selenium	NA	0.025 [d]
Silver	NA	0.40 [d]
Zinc	NA	1.5 [d]

[a] Montgomery and Welkom, 1990.
[b] Calculated according to Travis and Arms, 1988, unless otherwise noted.
[c] Yadiv et al., 1981.
[d] Baes et al., 1984
Kow Octanol/water partition coefficient.

TABLE 5-41
Exposure of Cottontail Rabbit to Soil and Associated Hazard Quotients, SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Cs [a] (mg/kg)	PU [b] (unitless)	Cveg (mg/kg)	Iv (kg/day)	Is (kg/day)	H (unitless)	BW (kg)	Exposure (mg/kg/day)	Benchmark [c] (mg/kg/day)	Hazard Quotient (unitless)
VOCs										
Acetone	0.061	0	0	0.237	0.015	1.0	1.2	0.0008	7.35	1.0E-04
Inorganics										
Arsenic	22	0.04	0.132	0.237	0.015	1.0	1.2	0.3011	0.05	6.0E+00
Cyanide	0.36	1	0.054	0.237	0.015	1.0	1.2	0.0152	41.94	3.6E-04
Nickel	66	0.06	0.594	0.237	0.015	1.0	1.2	0.9423	29.4	3.2E-02
Zinc	230	1.5	51.75	0.237	0:015	1.0	1.2	13.0956	117.58	1.1E-01
									HI	6

[a] Constituent concentration in SWMU 23 subsurface soil from Table 5-1.
[b] Plant uptake factor discussed in text.
[c] Toxicological benchmark from Table 5-39.

BW Body weight.
Cs Constituent concentration in subsurface soil.
Cveg Constituent concentration in vegetation (Cs x PU).
H Home range/area of concern. Assumed to be 1.
HI Hazard index (sum of the hazard quotients).
Is Ingestion rate of soil.
Iv Ingestion rate of vegetation.
mg/kg/day Milligrams per kilograms per day.
NA Not available.
PU Plant uptake factor.

TABLE 5-42
Exposure of Cottontail Rabbit to Sludge and Associated Hazard Quotients, SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Cs [a] (mg/kg)	PU [b] (unitless)	Cveg (mg/kg)	Iv (kg/day)	Is (kg/day)	H (unitless)	BW (kg)	Exposure (mg/kg/day)	Benchmark [c] (mg/kg/day)	Hazard Quotient (unitless)
VOCs										
2-Butanone (MEK)	0.53	1.86	0.15	0.237	0.015	1.0	1.2	0.0358	NA	NA
Acetone	1.2	0	0	0.237	0.015	1.0	1.2	0.0150	7.35	2.0E-03
Xylenes	0.90	0.56	0.0756	0.237	0.015	1.0	1.2	0.0262	0.82	3.2E-02
SVOCs										
4-Methylphenol	10	0.58	0.87	0.237	0.015	1.0	1.2	0.2968	NA	NA
Acenaphthylene	11	0.04	0.066	0.237	0.015	1.0	1.2	0.1505	NA	NA
Anthracene	3.8	0.47	0.2679	0.237	0.015	1.0	1.2	0.1004	39.76	2.5E-03
Benzo(a)anthracene	45	0.41	2.7675	0.237	0.015	1.0	1.2	1.1091	NA	NA
Benzo(b)fluoranthene	57	0.39	3.3345	0.237	0.015	1.0	1.2	1.3711	NA	NA
Benzo(g,h,i)perylene	40	0.38	2.28	0.237	0.015	1.0	1.2	0.9503	NA	NA
Benzo(k)fluoranthene	27	0.38	1.539	0.237	0.015	1.0	1.2	0.6415	NA	NA
Benzo(a)pyrene	47	0.39	2.7495	0.237	0.015	1.0	1.2	1.1305	0.4	2.8E+00
Chrysene	39	0.41	2.3985	0.237	0.015	1.0	1.2	0.9612	NA	NA
Dibenzo(a,h)anthracene	3.2	0.39	0.1872	0.237	0.015	1.0	1.2	0.0770	NA	NA
Fluoranthene	25	0.44	1.65	0.237	0.015	1.0	1.2	0.6384	4.97	1.3E-01
Fluorene	5.4	0.48	0.3888	0.237	0.015	1.0	1.2	0.1443	4.97	2.9E-02
Indeno(1,2,3-cd)pyrene	39	0.36	2.106	0.237	0.015	1.0	1.2	0.9034	NA	NA
Naphthalene	4.1	0.46	0.2829	0.237	0.015	1.0	1.2	0.1071	NA	NA
Phenanthrene	14	0.47	0.987	0.237	0.015	1.0	1.2	0.3699	NA	NA
Pyrene	31	0.43	1.9995	0.237	0.015	1.0	1.2	0.7824	2.98	2.6E-01
Inorganics										
Arsenic	42	0.04	0.252	0.237	0.015	1.0	1.2	0.5748	0.05	1.1E+01
Barium	450	0.15	10.125	0.237	0.015	1.0	1.2	7.6247	3.75	2.0E+00
Chromium	190	0.008	0.228	0.237	0.015	1.0	1.2	2.4200	2011.39	1.2E-03
Copper	240	0.4	14.4	0.237	0.015	1.0	1.2	5.8440	11.19	5.2E-01
Cyanide	140	1	21	0.237	0.015	1.0	1.2	5.8975	41.94	1.4E-01
Lead	51	0.45	3.4425	0.237	0.015	1.0	1.2	1.3174	5.88	2.2E-01
Mercury	8.6	0.90	1.161	0.237	0.015	1.0	1.2	0.3368	0.02	1.7E+01
Nickel	270	0.06	2.430	0.237	0.015	1.0	1.2	3.8549	29.4	1.3E-01
Selenium	150	0.0	0.5625	0.237	0.015	1.0	1.2	1.9861	0.15	1.3E+01
Silver	8.0	0.4	0.48	0.237	0.015	1.0	1.2	0.1948	0.63	3.1E-01
Zinc	300	1.5	67.5	0.237	0.015	1.0	1.2	17.0813	117.58	1.5E-01
									HI	950

Footnotes on page 2.

TABLE 5-42
Exposure of Cottontail Rabbit to Sludge and Associated Hazard Quotients, SWMU 23
Land Disposal Areas RFI
Sloss Industries Corporation

[a]	Constituent concentration in SWMU 23 sludge waste samples from Table 5-2.
[b]	Plant uptake factor discussed in text.
[c]	Toxicological benchmark from Table 5-39.
BW	Body weight.
Cs	Constituent concentration in waste sludge.
Cveg	Constituent concentration in vegetation (Cs x PU).
H	Home range/area of concern. Assumed to be 1.
HI	Hazard index (sum of the hazard quotients).
Is	Ingestion rate of soil.
Iv	Ingestion rate of vegetation.
mg/kg/day	Milligrams per kilograms per day.
NA	Not available.
PU	Plant uptake factor.

TABLE 5-43
Exposure of Cottontail Rabbit to Soil and Associated Hazard Quotients, SWMU 38 and 39
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Cs [a] (mg/kg)	PU [b] (unitless)	Cveg (mg/kg)	Iv (kg/day)	Is (kg/day)	H (unitless)	BW (kg)	Exposure (mg/kg/day)	Benchmark [c] (mg/kg/day)	Hazard Quotient (unitless)
VOCs										
Toluene	0.0040	0.6	0.0004	0.237	0.015	1.0	1.2	0.0001	10.33	1.2E-05
Inorganics										
Antimony	4.1	0.2	0.123	0.237	0.015	1.0	1.2	0.0755	0.05	1.5E+00
Barium	400	0.15	9	0.237	0.015	1.0	1.2	6.7775	3.75	1.8E+00
Copper	25	0.4	1.5	0.237	0.015	1.0	1.2	0.6088	11.19	5.4E-02
Cyanide	0.28	1	0.042	0.237	0.015	1.0	1.2	0.0118	41.94	2.8E-04
Nickel	29	0.06	0.261	0.237	0.015	1.0	1.2	0.4140	29.4	1.4E-02
Silver	1.2	0.4	0.072	0.237	0.015	1.0	1.2	0.0292	0.63	4.6E-02
Zinc	91	1.5	20.475	0.237	0.015	1.0	1.2	5.1813	117.58	4.4E-02
									HI	3

[a] Constituent concentration in SWMU 38 and 39 subsurface soil from Table 5-5.
[b] Plant uptake factor discussed in text.
[c] Toxicological benchmark from Table 5-39.

BW Body weight.
Cs Constituent concentration in subsurface soil.
Cveg Constituent concentration in vegetation (Cs x PU).
H Home range/area of concern. Assumed to be 1.
HI Hazard index (sum of the hazard quotients).
Is Ingestion rate of soil.
Iv Ingestion rate of vegetation.
mg/kg/day Milligrams per kilograms per day.
NA Not available.
PU Plant uptake factor.

j:\proj\tf320\landdisp\rpt\table\05-43lan.xls
2:18 PM 1/12/98

ARCADIS GERAGHTY&MILLER

TABLE 5-44
Exposure of Cottontail Rabbit to Sludge and Associated Hazard Quotients, SWMU 39
Land Disposal Areas RFI
Sloss Industries Corporation

Constituent	Cs [a] (mg/kg)	PU [b] (unitless)	Cveg (mg/kg)	Iv (kg/day)	Is (kg/day)	H (unitless)	BW (kg)	Exposure (mg/kg/day)	Benchmark [c] (mg/kg/day)	Hazard Quotient (unitless)
SVOCs										
Benzo(k)fluoranthene	0.63	0.38	0.03591	0.237	0.015	1.0	1.2	0.0150	NA	NA
Inorganics										
Antimony	15	0.2	0.45	0.237	0.015	1.0	1.2	0.2764	0.05	5.5E+00
Barium	260	0.15	5.85	0.237	0.015	1.0	1.2	4.4054	3.75	1.2E+00
Cadmium	12	0.04	0.072	0.237	0.015	1.0	1.2	0.1642	0.01	1.6E+01
Copper	160	0.4	9.6	0.237	0.015	1.0	1.2	3.8960	11.19	3.5E-01
Cyanide	8.3	1	1.245	0.237	0.015	1.0	1.2	0.3496	41.94	8.3E-03
Lead	320	0.45	21.6	0.237	0.015	1.0	1.2	8.2660	5.88	1.4E+00
Nickel	25	0.06	0.225	0.237	0.015	1.0	1.2	0.3569	29.4	1.2E-02
Silver	4.6	0.4	0.276	0.237	0.015	1.0	1.2	0.1120	0.63	1.8E-01
Zinc	3,100	1.5	697.5	0.237	0.015	1.0	1.2	176.5063	117.58	1.5E+00
									HI	27

[a] Constituent concentration in SWMU 38 and 39 sludge waste samples from Table 5-6.
[b] Plant uptake factor discussed in text.
[c] Toxicological benchmark from Table 5-39.

BW Body weight.
Cs Constituent concentration in subsurface soil.
Cveg Constituent concentration in vegetation (Cs x PU).
H Home range/area of concern. Assumed to be 1.
HI Hazard index (sum of the hazard quotients).
Is Ingestion rate of soil.
Iv Ingestion rate of vegetation.
mg/kg/day Milligrams per kilograms per day.
NA Not available.
PU Plant uptake factor.

265

j:\proj\tf320\landdisp\rpt\table\05-44lan.xls
1:45 PM 1/12/98

ARCADIS GERAGHTY&MILLER

VOLUME I

APPENDIX A

FIELD LOGS

VOLUME I

APPENDIX A.1

SURFICIAL SOIL SAMPLING

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-02~~ 24-SL0002 KP 11/6/98

Sample I.D. No. 970618 -LD- 24 -SL0002 ~~(0-1)~~ KP Coded/Replicate No.

Date 6/18/97 Time of Sampling: Begin 1600 End

Weather Sunny 80's

Site Description Down bank from lime pile just east of drainage ditch

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content Moist

Color Mod brown (5YR 4/4) & light brown (5YR 5/6) mottled Odor —

Description Clay, stiff (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
~~Full TCLP~~	~~2 x 8 oz~~ JCH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ Mixed in stainless steel bowl with stainless steel spoon
Saw at surface

Sampler(s) J. Hughes/David Page

Southpoint 89 109

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 2 of 15

(KT) 1/6/98

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-02~~ 24-SL0003

Sample I.D. No. 970617 -LD-24 -SL 0003 ~~(0-1')~~ (KT) Coded/Replicate No. 970617-LD-24-FB0001 / 970617-LD-24-EB00 / 970617-LD-24-FB0002 / 970617-LD-24-EB00

Date 6/17/97 Time of Sampling: Begin 1210 End

Weather OVERCAST 80's

Site Description ± 10' EAST OF GATE AS INDICATED ON PROPOSED LOCATION MAP

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content MOIST

Color MOD BROWN (5YR 3/4) w/ SOME VERY DARK RED (5R 2/6) Odor NONE

Description CLAY w/ SOME ROCK (RED MTN S/S + SOME POSSIBLE L.S.)
CLAY WAS VERY BRITTLE w/ SOME ROOTS (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
~~Full TCLP~~	~~2 x 8 oz~~ KH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon SOIL AT 8" UNDER M FLO DUST
EB + FB COLLECTED , FB + EB SPLIT w/ GUARDIAN ALSO CRYSTAL SPRINGS DISTILLED H_2O
(BTLD 5/19/99 AP 14:43 EXP 5/19/99) FB
" " AP 18:14 " EB

Sampler(s) J. Hughes/David Page

269

Southprint 89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 3 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-04~~ KP 1/6/98 24-SL0004

Sample I.D. No. 970617 -LD- 24 -SL0004 ~~(0-1')~~ KP Coded/Replicate No. —

Date 6/17/97 Time of Sampling: Begin 1530 End

Weather LIGHT RAIN, 70's, CLOUDY

Site Description PARTWAY BETWEEN FLUDUST PILE ACESS GATE & BTF GATE AS PER SAMPLING PLAN. ADJACENT TO TWO TELEPHONE POLES & PROPERTY LINE FENCE

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content MOIST

Color MOD BROWN (5YR 4/4) & GRAYISH ORANGE (10YR 7/4) MOTTLED Odor —

Description CLAY, PLASTIC, COHESIVE. (CL)

Analyses Required

Container Description

From Lab X or G&M

Analyses Required	Container Description
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
~~Full TCLP~~	~~2 x 8 oz~~ JH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon
CALL AT SURFACE

Sampler(s) J. Hughes/David Page

Southpoint 89 109

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 9 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-05~~ 24-SL0005 (FP 1/6/98)

Sample I.D. No. 970617 -LD-24 -SL0005 ~~(0-1')~~ Coded/Replicate No. SPLIT W/ GUARDIAN

Date 6/17/97 Time of Sampling: Begin 1615 End

Weather Cloudy, 70's, very light rain

Site Description SE corner of SWMU 24 As not proposed in workplan

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content Moist → Saturated

Color Dusky Brown (5YR 2/2) Odor —

Description Clay, very loose, w/ organics (roots) (CH)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 8 oz
~~Full TCLP~~ JH	~~2 x 8 oz~~ JH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ Mixed in stainless steel bowl with stainless steel spoon
SPLIT COLLECTED FOR GUARDIAN TO ANALYZE (LABELED W/SAME #) SOIL AT SURFACE

Sampler(s) J. Hughes/David Page

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 5 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-06~~ 1/6/98 KT 24-SL0006

Sample I.D. No. 970617 -LD- 24 -SL0006 ~~(0-1')~~ KT MS/MSD + 970617-LD-24-SL9001 Coded/Replicate No.

Date 6/17/97 Time of Sampling: Begin 1700 End

Weather SUNNY 70's

Site Description 1st LOCATION N OF SB-05 AS INDICATED IN WORKPLAN

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content MOIST

Color MOD BROWN (5YR 3/4) & GRAYISH ORANGE (10YR 7/4) MOTTLED Odor —

Description CLAY, STIFF, COHESIVE, W/ SOME PEBBLE SIZED ROCK (L.S.) (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
~~Full TCLP~~ JH	~~2 x 8 oz~~ JH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon
SOIL LOCATED UNDER 8" OF FLU DUST

Sampler(s) J. Hughes/David Page

Southpoint 89 109

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 . Page 6 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-07~~ KP 1/6/98 24-SL0007

Sample I.D. No. 970617 -LD-24 -SL0007 ~~(0-1')~~ KP Coded/Replicate No. -

Date 6/17/97 Time of Sampling: Begin 1740 End

Weather Sunny 70's W-N wind 0-5mph

Site Description 2nd soil boring N of SB05, ± 1FT above drainage ditch

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content Saturate

Color Very pale orange (10YR 8/2) Odor Chemical

Description Clay to very sandy clay, plastic, w/ a few blobs of black "tarlike" material w/ chemical odor (CH)

Analyses Required

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
~~Full TCLP~~	~~2 x 8 oz~~ JH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ Mixed in stainless steel bowl with stainless steel spoon
Soil located beneath ± 1FT of Flu Dust

Sampler(s) J. Hughes/David Page

273

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 7 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-08~~ KP 1/16/98 24-SL0008

Sample I.D. No. 970618 -LD- 24 -SL0008 ~~(0-1')~~ KP Coded/Replicate No. —

Date 6/18/97 Time of Sampling: Begin 955 End

Weather Cloudy, 80's, N wind

Site Description E Side of Ditch From Proposed location

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content Moist

Color (5YR5/6) (5YR 3/4) Light Brown to Mod Brown Mottled Odor —

Description Clay, Stiff, w/organics (roots) CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full ~~TCLP~~	~~2 x 8 oz~~ JH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Mixed ~~composited~~ in stainless steel bowl with stainless steel spoon
Soil at Surface

Sampler(s) J. Hughes/David Page

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 8 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-09~~ 1/6/98 24-SL0009

Sample I.D. No. 970618 -LD- 24 -SL 0009 ~~(0-1')~~ Coded/Replicate No. —

Date 6/18/97 Time of Sampling: Begin 1010 End

Weather OVERCAST 80's

Site Description E SIDE OF DITCH FROM PROPOSED LOCATION

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content MOIST

Color 5YR 5/6 LIGHT BROWN & 5YR 3/4 MOD BROWN MOTTLED Odor —

Description CLAY, STIFF, w/ORGANICS (ROOTS) (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
~~Full TCLP~~	~~2 x 8 oz~~

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon

COOL AT SURFACE

Sampler(s) J. Hughes/David Page

Southpoint 89 109

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 9 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-10~~ 24-SL0010 (KH 1/6/98)

Sample I.D. No. 970618 -LD- 24 -SL0010 ~~(0-1)~~ (KH) Coded/Replicate No. —

Date 6/18/97 Time of Sampling: Begin 1010 End

Weather OVERCAST 80's

Site Description E SIDE OF DITCH FROM PROPOSED LOCATION

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content —

Color (5YR2/2) (5YR5/6) DARK BROWN & LIGHT BROWN (CLAY) Odor —

Description CLAY, PLASTIC, BROWN SOIL (SILTY SAND) (CH)

Analyses Required / Container Description

From Lab X or G&M

Analyses Required	Container Description
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	~~2 x 8 oz~~ JH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon

SPLIT AT SURFACE

Sampler(s) J. Hughes/David Page

Southpoint 89 109

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 10 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-11~~ 24-SL0011 1/16/98

Sample I.D. No. 970618 -LD-24 -SL0011 ~~(0-1)~~ Coded/Replicate No. SPLIT W/ GUARDIAN 970618-LD-24-SL0011

Date 6/18/97 Time of Sampling: Begin 1115 End

Weather SUNNY TO OVERCAST, W. WIND, 0-5 mph, 80's

Site Description S. SIDE OF ROAD AS PROPOSED

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) 5YR5/6 5YR3/4 Moisture Content DRY

Color LIGHT BROWN & MOD BROWN MOTTLED Odor —

Description CLAY, VERY STIFF (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
~~Full TCLP~~	~~2 x 8 oz~~ JH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon
SOIL LOCATED UNDER 18" OF FINE DUST

Sampler(s) J. Hughes/David Page

Southpoint 89 109

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 11 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-12~~ (KT) 11/6/98 24-SL0012

Sample I.D. No. 970618 -LD-24 -SL 0012 ~~(0-1')~~ (KT) Coded/Replicate No. —

Date 6/18/97 Time of Sampling: Begin 1145 End

Weather OVERCAST 80'S

Site Description S. SIDE OF ROAD AS PROPOSED ADJACENT TO FLUE PILE

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content DRY

(5YR 5/6) - (5YR 3/2)

Color LIGHT BROWN & MOD BROWN MOTTLED Odor —

Description CLAY, VERY STIFF (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
~~Full TC~~LP	~~2 x 8 oz~~ 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's MIXED ~~Composited~~ in stainless steel bowl with stainless steel spoon

SOIL UNDER 2FT OF FLUE DUST

Sampler(s) J. Hughes/David Page

Southpoint 89 109

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 12 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-15~~ 24-SL0013 ED 1/6/98

Sample I.D. No. 970618-LD-24-SL0013 ~~(0-1')~~ ED Coded/Replicate No. ____

Date 6/18/97 Time of Sampling: Begin 1540 End ____

Weather SUNNY, 90's, HUMID

Site Description DOWN HILL TO WEST OF P-28 & EDGE OF LIME PILE

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content MOIST

Color MOD BROWN (5YR 4/4 Odor —

Description CLAY, STIFF (CL)

Analyses Required	Container Description
	From Lab X or G&M ____
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 8 oz
Full TCLP	~~2 x 8 oz~~

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon
SOIL AT SURFACE

Sampler(s) J. Hughes/David Page

Southpoint 89 109

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 13 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-14~~ 24-SL0014 KJ 1/6/98

Sample I.D. No. 97061B -LD-24 -SL0014 ~~(0-1')~~ KJ Coded/Replicate No. —

Date 6/18/97 Time of Sampling: Begin 1520 End

Weather SUNNY

Site Description JUST WEST OF EDGE OF LIME MOUNDS

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content MOIST

Color PALE YELLOWISH BROWN (10YR 6/2) Odor —

Description CLAY, W/SOME SAND, & ROCKS (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	~~2 x 8 oz~~

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon

SMC AT SURFACE

Sampler(s) J. Hughes/David Page

Southpoint 89 109

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 14 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-15~~ JSD 1/6/98 24-SL0015

Sample I.D. No. 970618 -LD-24 -SL0015 ~~LD-14~~ EP Coded/Replicate No. —

Date 6/18/97 Time of Sampling: Begin 1415 End

Weather SUNNY 80's S WIND

Site Description S SIDE OF ROAD, E 50 FT NORTH OF PROPOSED LOCATION

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content DRY

Color (10YR 7/4) (5YR 2/2) GRAYISH ORANGE & DUSKY BROWN MOTTLING Odor —

Description CLAY, STIFF (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
~~Full TCLP~~	~~2 x 8 oz~~ JH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon
SOIL AT SURFACE

Sampler(s) J. Hughes/David Page

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 15 of 15

Site Location Sloss Industries, Birmingham, AL Location Name ~~SB-15~~ KT 1/6/98 24-SL0016

Sample I.D. No. 970618 -LD-24 -SL0016 ~~(0-1')~~ Coded/Replicate No. —

Date 6/18/97 Time of Sampling: Begin 1315 End

Weather SUNNY, 80's, HUMID

Site Description E SIDE OF ROAD APPROX 100' FROM Y IN ROAD

SAMPLING DATA

Collection Method Stainless Steel Hand Auger

Depth (0-1) Moisture Content MOIST

Color MOD BROWN 5YR 3/4 Odor —

Description SOIL, SAND + CLAY (CL - SC)

Analyses Required	Container Description
	From Lab X or-G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
~~Full TCLP~~ JH	~~2 x 8 oz~~ JH

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon
SOIL AT SURFACE

Sampler(s) J. Hughes/David Page

Southprint 89 109

VOLUME I

APPENDIX A.2

SLUDGE SAMPLING

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 4

Site Location Sloss Industries, Birmingham, AL Location Name ~~SM 0+~~ 23-SM0001 KT 1/6/98.

Sample I.D. No. 970619 -LD- 23-SM~~000~~1 ~~(0-1')~~ Coded/Replicate No. ~~970619-LD-23-SM[illegible]~~ 970619-LD-23-SM9001 + SPLIT W/GUARDIAN (coded)

Date 6/19/97 Time of Sampling: Begin ______ End ______

Weather SUNNY, 90's HUMID

Site Description NE QUADRANT OF SWMU 23

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA Moisture Content MOIST

Color BLACK (N1) & MOD BROWN (5YR 4/4) MOTTLED Odor SEPTIC

Description SLUDGE

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	2 x ~~8 oz~~ 1L

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon
SPLIT W/GUARDIAN COLLECTED.

Sampler(s) J. Hughes/David Page

Southprint 89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TFQ320.015 Page 2 of 4

Site Location Sloss Industries, Birmingham, AL Location Name 23-SM002 ~~(0-1)~~

Sample I.D. No. 970619-LD-23-SM002 ~~(0-1)~~ Coded/Replicate No. —

Date 6/19/97 Time of Sampling: Begin 1530 End

Weather SUNNY, 90's, HUMID

Site Description SE QUADRANT OF SWMU 23

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA Moisture Content SATURATED

Color BLACK (NI) Odor SEPTIC

Description SLUDGE

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	2 x ~~8 oz~~ 1 LITER

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes/David Page

Southprint 89-1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 3 of 4

Site Location Sloss Industries, Birmingham, AL Location Name ~~SM-09~~ 23-SM0003 KT 1/6/98

Sample I.D. No. 970619 -LD- 23-SM0003 ~~(0-1')~~ Coded/Replicate No. —

Date 6/19/97 Time of Sampling: Begin 1555 End

Weather SUNNY 90's

Site Description NW QUADRANT OF SWMU 22

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA Moisture Content SATURATED

Color MOD BROWN (5YR 3/4) Odor SEPTIC

Description SLUDGE

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	1 x ~~8 oz~~ LITER 2X4oz (VOCs)

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's MIXED ~~Composited~~ in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes/David Page

288

Southprint 89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 4 of 4

KP 1/6/98

Site Location Sloss Industries, Birmingham, AL Location Name ~~SM-04~~ 23-SM0004

Sample I.D. No. 970619-LD-23-SM0004 ~~(0-1')~~ Coded/Replicate No. —

KP

Date 6/19/97 Time of Sampling: Begin 1605 End —

Weather SUNNY 90's

Site Description SW QUADRANT OF SWMU 23

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA Moisture Content SATURATED

Color BLACK (N1) Odor SEPTIC

Description SLUDGE

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	2 x 4 oz (Voc's) + 1 x LITER (TOTAL)

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes/David Page

Southprint 89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 | Page 1 of 4

Site Location Sloss Industries, Birmingham, AL | Location Name ~~SM-OT~~ 24-SM0001 (KT 1/6/98)

Sample I.D. No. 970619-LD-24-SM0001 ~~(0-1')~~ (KT) | Coded/Replicate No. 970619-LD-24-SM9001 SPLIT W/ [illegible]

Date 6/19/97 | Time of Sampling: Begin 1050 End

Weather Sunny, 90's

Site Description NW Quadrant of SWMU 24

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA | Moisture Content Dry

Color Dusky Brown (5YR 2/2) | Odor —

Description Fine Dust

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 8 oz
Full TCLP	2 x ~~8 oz~~ 1 liter

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ Mixed in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes/David Page

Southprint 89-1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 2 of 9

Site Location Sloss Industries, Birmingham, AL Location Name ~~SM-02~~ 24-SM0002 KT 1/6/98

Sample I.D. No. 970619 -LD- 29 -SM 002 ~~(0-1')~~ KD Coded/Replicate No. —

Date 6/19/97 Time of Sampling: Begin 1120 End

Weather Sunny 80's

Site Description SW QUADRANT of SWMU 24

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA Moisture Content DRY

Color DUSKY BROWN (5YR2/2) Odor —

Description FINE DUST

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	2 x ~~8 oz~~ 1 Liter

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ Mixed in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes/David Page

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 3 of 4

Site Location Sloss Industries, Birmingham, AL Location Name 24-SM-0003 (KT) 1/6/98

Sample I.D. No. 970619 -LD-24 -SM0003 ~~(0-1')~~ (KT) Coded/Replicate No. —

Date 6/19/97 Time of Sampling: Begin 1145 End

Weather SUNNY 90's

Site Description SE QUADRANT OF SWMU 24

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA Moisture Content DRY

Color DUSKY BROWN (5YR 2/2) Odor —

Description FLUE DUST

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	2 x ~~8 oz~~ 1 LITER

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non-VOC's MIXED ~~Composited~~ in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes/David Page

Southprint 89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 4 of 4

Site Location Sloss Industries, Birmingham, AL Location Name 24- SM0004 KB 1/16/98

Sample I.D. No. 970619 -LD- 24 -SM0004 ~~10-1~~ KB Coded/Replicate No.

Date 6/19/97 Time of Sampling: Begin 1235 End

Weather SUNNY overcast 90's

Site Description NE QUADRANT OF YWMU 29

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA Moisture Content MOIST

Color DUSKY BROWN (5YR2/2) Odor —

Description FINE DUST

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	2 x ~~8 oz~~ 1 LITER

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes/David Page

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 — 116198 — Page 1 of 6

Site Location Sloss Industries, Birmingham, AL — Location Name ~~SM-01~~ KT 39-SM0001

970616-LD-39-EB0001
970616-LD-39-FB0001

Sample I.D. No. 970616 -LD- 39 -SM0001 ~~(0-1')~~ — Coded/Replicate No.

Date 6/16/97 — Time of Sampling: Begin 1620 End

Weather SUNNY → OVERCAST, 80's, 5 WIND

Site Description S END OF SWMU 39 FROM BOTTOM 1/3 OF PILE

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA — Moisture Content MOIST

Color very dusky red 10R 2/2 — Odor —

Description Fine grained material w/some medium grained material "iron" like particles present

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	2 x ~~8 oz~~ 1L

NOT ANALYZED BY LAB JH 12/15/97

Sample Monitoring (TIP, OVA, HNU, etc.) —

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon
EB & FB COLLECTED w/ SUPERBRAND SODIUM FREE DISTILLED H_2O LOT # DNOV997

Sampler(s) J. Hughes/David Page

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 2 of 6

Site Location Sloss Industries, Birmingham, AL Location Name ~~SM-02~~ 39-SM0002 1/6/98

Sample I.D. No. 970616-LD-39-SM0002 ~~(0-1')~~ Coded/Replicate No. —

Date 6/16/97 Time of Sampling: Begin 1025 End

Weather SUNNY, 70's, LIGHT WIND FROM SOUTH

Site Description WEST SIDE OF SWMU 39, ± 1/2 WAY UP PILE, ± 1/3 WAY UP FROM S END OF SWMU 39

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA Moisture Content DRY

Color VERY DUSKY RED 10R 2/2 Odor —

Description FLUE DUST

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	2 x ~~8 oz~~ 1 LITER

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes/David Page

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 | Page 3 of 6

Site Location Sloss Industries, Birmingham, AL | Location Name ~~SM-03~~ ~~11+148~~ 39-SM0003 | 970616-LD-39-SM9001

Sample I.D. No. 970616-LD-39-SM0003 ~~(0-1')~~ | Coded/Replicate No. —

Date 6/16/97 | Time of Sampling: Begin 1700 End

Weather OVERCAST 80's, S WIND

Site Description E SIDE OF SWMU 39 ABOUT 3/4 WAY UP FROM SOUTHERN END

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA | Moisture Content DRY

Color very dusky red (10 R 2/2) | Odor —

Description Fine to medium grained material, hard, w/ some silver colored particles in it

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	2 x ~~8 oz~~ 1 L

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's ~~Composited~~ MIXED in stainless steel bowl with stainless steel spoon

DUPLICATE OF 39 COLLECTED

Sampler(s) J. Hughes/David Page

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 4 of 6

Site Location Sloss Industries, Birmingham, AL Location Name ~~SM-01~~ 39-SM0004 (KH) 1/6/98

Sample I.D. No. 970616-LD-39-SM0004 ~~(0-1')~~ (E?) Coded/Replicate No. —

Date 6/16/97 Time of Sampling: Begin 1400 End

Weather OVERCAST, 70's, NO WIND

Site Description N END OF SWMU 39. COLLECTED ≈ 1/3 UP FROM BOTTOM OF PILE

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA Moisture Content DRY

Color VERY DUSKY RED (10 R 2/2) Odor —

Description FINE TO MED. GRAINED, MED HARD,

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 4 oz
SVOCs (8270)	1 x 4 oz
Cyanide (9010)	1 x 4 oz
Full TCLP	2 x ~~8 oz~~ 1 LITER

NOT ANALYZED BY LAB JH 12/19/97

Sample Monitoring (HP, OVA, HNU, etc.)

Remarks Non VOC's MIXED ~~Composited~~ in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes/David Page

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 5 of 6

Site Location Sloss Industries, Birmingham, AL Location Name ~~SM-05~~ 39-SM0005 ED 1/6/98

Sample I.D. No. 970619-LD-39-SM0005 ~~(0-1')~~ Coded/Replicate No.

Date 6/19/97 Time of Sampling: Begin 1710 End

Weather SUNNY

Site Description APPROXIMATELY 1/3 OF WAY FROM N END OF SWMU 39. ON WEST SIDE OF SWMU 39. ± 5FT UP BANK FROM ROAD CUT IN FOR PIPELINE

SAMPLING DATA

Collection Method Stainless Steel Spoon

Depth NA Moisture Content DRY

Color VERY DUSKY RED (10R 2/2) Odor —

Description FLUEDUST

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz
Full TCLP	2 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's MIXED ~~Composited~~ in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes/David Page

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 6 of 6

Site Location Sloss Industries, Birmingham, AL LOCATION NAME: 39- SM0006 (ELP) 1/6/98

Sample I.D. No. 970619-LO-39-SM0006 Coded/Replicate No. —

Date 6/19/97 Time of Sampling: Begin 1735 End

Weather SUNNY 80's

Site Description APPROX. 1/3 LENGTH OF SWMU 39 N OF ACCESS ROAD AT MW-34S&D HEADING DOWN ACCESS ROAD. ON WEST SIDE OF PILE APPROX 5 TO 10 FT UP BANK

SAMPLING DATA

Collection Method STAINLESS STEEL SPOON

Depth NA Moisture Content DRY

Color VERY DUSKY RED (10R 2/2) Odor —

Description FINE DUST

Analyses Required	Container Description (From Lab x or G&M)
PRIORITY POLLUTANT METALS & BARIUM (6010 & 7471)	1 x 4 oz GLASS
VOCs (8260)	1 x 8 oz GLASS
SVOCs (8270)	1 x 8 oz GLASS
CYANIDE (9010)	1 x 8 oz GLASS
FULL TCLP	2 x 8 oz GLASS

Sample Monitoring (TIP, OVA, HNU, etc.) —

Remarks NON VOC'S MIXED IN STAINLESS STEEL BOWL W/STAINLESS STEEL SPOON

Sampler(s) J. HUGHES / D. PAGE

Southprint 89-1093

VOLUME I

APPENDIX A.3

SUBSURFACE SOIL SAMPLING

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: MW-21

Sample I.D. No. 970806 -LD- 23 -SL0021 (14-16) Coded/Replicate No. —

Date 8/ 6 /97 Time of Sampling: Begin 1445 End

Weather SUNNY 80'S

Site Description AT MW-21, JUST BELOW STEEP CHANGE IN SLOPE

SAMPLING DATA

Collection Method Split spoon

Depth 14-16 Moisture Content MOIST

Color LIGHT BROWN (5YR 6/4) Odor —

Description CLAY, slightly plastic (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

OVM - ND

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

302

Southprint 89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 2 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: MW-21

Sample I.D. No. 970806 -LD-23 -SL0021 (20-22) Coded/Replicate No. 970806-LD-23-SL9021

Date 8/6/97 Time of Sampling: Begin 1430 End

Weather SUNNY, 80's

Site Description AT MW-21, JUST BELOW STEEP CHANGE IN SLOPE

SAMPLING DATA

Collection Method Split spoon.

Depth 20-22 Moisture Content MOIST

Color LIGHT BROWN (5YR 5/6) Odor —

Description CLAY, STIFF, w/some laminations like original bedding(?) (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

PID-ND

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

Southprint 89-1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page / of 1

Site Location Sloss Industries, Birmingham, AL Location Name: 23-SBMW-22 (Kf) 1/6/98

Sample I.D. No. 970806 -LD- 23 -SB0022 (0-2) Coded/Replicate No. ~

Date 8/ 6 /97 Time of Sampling: Begin 740 End

Weather SUNNY Hi 70's TO Low 80's

Site Description AT MW-22

SAMPLING DATA

Collection Method Split spoon

Depth 0-2 Moisture Content DRY

Color DUSKY BROWN (5YR 2/2) + LIGHT BROWN (5YR 5/6) Odor —

Description CLAY w/ CHERT & SANDSTONE (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

OVM - ND

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon
5 (7/6/7. SANDSTONE PRESENT AT 2 FT BGS

Sampler(s) J. Hughes

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: 23-SBMW23 (KT) 1/6/98

Sample I.D. No. 9708 ~~05~~ -LD- 23 SL 023 (12-14) Coded/Replicate No. —

Date 8/6/97 Time of Sampling: Begin 930 End

Weather Sunny 80's

Site Description At MW-23

SAMPLING DATA

Collection Method Split spoon.

Depth 12-14 Moisture Content Dry

Color Light Brown (5YR 5/6) w/ very pale orange (10YR 8/2) Odor —

Description Clay stiff (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

Southprint 89-1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 2 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: 23-SB ~~MW23~~ (KF) 1/6/98

Sample I.D. No. 9708~~05~~ -LD- 23 -SL 0023 (24-26) Coded/Replicate No. —

Date 8/6/97 Time of Sampling: Begin 1020 End

Weather Sunny 80's

Site Description At MW-23

SAMPLING DATA

Collection Method Split spoon.

Depth 24-26 Moisture Content Moist to dry

Color 5YR 6/6 LIGHT BROWN w/ 5YR 2/2 DARK BROWN LAMINATIONS Odor —

Description CLAY, plastic to stiff, HAS LAYERED LOOK LIKE ORIGINALLY BEDDED (CL-CH)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 2

Site Location Sloss Industries, Birmingham, AL (KX 9/17/97) Location Name: 23-SB MW-24 KX 1/6/98

Sample I.D. No. 970805 -LD-23 -SL 0024 (~~6-8~~ 7-9) Coded/Replicate No. 970805-LD-23-SL0024 (7-9) MS/MSD

Date 8/05/97 Time of Sampling: Begin 1515 End

Weather Sunny 80's

Site Description At MW-24

SAMPLING DATA

Collection Method Split spoon

Depth ~~7~~ 8 Moisture Content Moist

Color Mod Brown 5YR 4/4 w/ Light Brown 5YR 5/6 Odor —

Description Clay, stiff, w/ chert fragments (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

5/4/10/19

Sampler(s) J. Hughes

Southprint 89-1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 2 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: 23-SB MW 24 KT 1/6/98

Sample I.D. No. 970805-LD-23-SL0024 (14-16) Coded/Replicate No. –

Date 8/5/97 Time of Sampling: Begin 1530 End

Weather Sunny 80's

Site Description AT MW-24

SAMPLING DATA

Collection Method Split spoon.

Depth 14-16 Moisture Content MOIST

Color LIGHT BROWN 5YR5/6 Odor –

Description CLAY, STIFF, w/ ~~SILT~~ CHERT FRAGMENTS (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

Southprint 89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 1

Site Location Sloss Industries, Birmingham, AL Location Name: 23-SBMW-25 KF 1/6/98

Sample I.D. No. 970805 -LD-23 -SL0025 (19-21) Coded/Replicate No.

Date 8/5/97 Time of Sampling: Begin 1345 End

Weather SUNNY 80's

Site Description ATMW-25 ±5 FT EAST OF CENTER OF WELL PAIR

SAMPLING DATA

Collection Method Split spoon

Depth 19 - 21 Moisture Content DRY

Color PALE OLIVE (10Y 6/2) w/ MOD YELLOWISH BROWN (10YR 5/4) MOTTLING Odor —

Description CLAY (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

Southprint 89-1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: 38-SB MW 26 KB 1/6/98

Sample I.D. No. 970804 -LD-38 -SL0026(10-12) KB 10-23-97 Coded/Replicate No. 970804-LD-38-SL0026

Date 8/04/97 Time of Sampling: Begin 1540 End

Weather Sunny 90's

Site Description AT mw-26

SAMPLING DATA

Collection Method Split spoon.

Depth 10-12 Moisture Content DRY

Color Mod Yellowish brown (10YR 5/4) + Mod Brown 5YR 4/4 + Light brownish gray (5YR 6/1) Odor

Description CLAY, Stiff (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

10/15/15/180

Sampler(s) J. Hughes

310

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 2 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: ~~38-~~ SB MW 26 1/6/98

Sample I.D. No. 970804 -LD- 38 -SL 0026 (18-20) ET 10-23-97 Coded/Replicate No.

Date 8/ 04 /97 Time of Sampling: Begin ~~1415~~ 1615 End

Weather Sunny 90's

Site Description AT MW-26

SAMPLING DATA

Collection Method Split spoon

Depth ~~20-22~~ 18-20 Moisture Content DRY

Color MOD YELLOWISH BROWN (10YR 5/4) + DUSKY BROWN (5YR 2/2) Odor NONE

Description CLAY, STIFF, w/ SOME CALCITE & L.S (FINE GR RECRYSTALLIZED) FRAGMENTS (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

43/32 | 27/20

Sampler(s) J. Hughes

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: 38-SB mw-27 KJ 1/16/98

Sample I.D. No. 9708 ~~05~~ -LD-38 -SL0027 (11-13) Coded/Replicate No. –

Date 8/5/97 Time of Sampling: Begin 800 End

Weather Sunny 70's

Site Description At MW-27

SAMPLING DATA

Collection Method Split spoon

Depth 11-13 Moisture Content ~~Plas.~~ Moist → Dry

Color Light Brown (5YR 5/6) w/ Dusky Red (5R 3/4) Mottling Odor –

Description Clay, w/ Iron Concretions, Plastic to Stiff (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

Southprint 89-1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: 38-SB MW-27 (KB) 1/6/98

Sample I.D. No. 9708 05 -LD- 38 -SL 0027 (22-24) Coded/Replicate No. –

Date 8/ 5 /97 Time of Sampling: Begin 8:5 End

Weather Sunny 70's

Site Description At MW-27

SAMPLING DATA

Collection Method Split spoon

Depth 22-24 Moisture Content Moist to saturated

Color Pale yellowish brown (10YR 6/2) Odor –

Description Clay, plastic, w/ limestone fragments (CH)

Saturated at bottom of spoon

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

1/46/50/2 18" recovery

Sampler(s) J. Hughes

Southprint 89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 1

Site Location Sloss Industries, Birmingham, AL Location Name: 38-38MW28 KB 1/6/98

Sample I.D. No. 970807-LD-38-SL0028 (8-10) Coded/Replicate No. 970807-LD-38-SL0028(8-10) MS/MSD

Date 8/7/97 Time of Sampling: Begin 1420 End

Weather SUNNY 80's

Site Description AT MW-28 ± 5FT SOUTH OF WELL

SAMPLING DATA

Collection Method Split spoon

Depth 8-10 Moisture Content MOIST

Color 10YR7/4) GRAYISH ORANGE w/ 5YR5/6 LIGHT BROWN & 5YR2/2 DUSKY BROWN MOTTLING Odor —

Description CLAY, stiff, (CL)

Analyses Required

Container Description

From Lab X or G&M

Analyses Required	Container Description
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

OVM - ND

Remarks, Non VOC's Composited in stainless steel bowl with stainless steel spoon

6/6/8/11 10/10/12/14

Sampler(s) J. Hughes

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 1

Site Location Sloss Industries, Birmingham, AL Location Name 38-SBMW-28 (KA) 1/6/98

Sample I.D. No. 970807-LD-38-SL0028 (13-15) Coded/Replicate No. —

Date 8/7/97 Time of Sampling: Begin 1625 End

Weather Sunny 80's

Site Description At MW-28 ± 5 ft South of well

SAMPLING DATA

Collection Method Split spoon.

Depth 13-15 Moisture Content Moist

Color Light Greenish Gray (5GY8/1), Light Brown (5YR5/6) & Brown mottled (5YR3/4) Odor —

Description Clay, Plastic to stiff (CL-CH)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

OVM - ND

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

315

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 1

Site Location Sloss Industries, Birmingham, AL Location Name: 38-SBMW 29 KI 1/6/98

Sample I.D. No. 970807-LD-38-SL0029 (15-17) Coded/Replicate No. —

Date 8/7/97 Time of Sampling: Begin 1220 End

Weather Sunny 80's

Site Description 1/2 WAY BETWEEN MW-30 & MW-28 ON SIDE ACCESS ROAD NEXT TO FENCE

SAMPLING DATA

Collection Method Split spoon

Depth 15-17 Moisture Content moist

'or light brown (5YR 5/6) Odor —

Description Clay, silt (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

OVM - ND

narks Non VOC's Composited in stainless steel bowl with stainless steel spoon

OVM - ND 11/12/12/15

Sampler(s) J. Hughes

316

Southprint 89-1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 2 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: 38-SB MW29 KT 1/6/98

Sample I.D. No. 970807 -LD- 38 -SL 0029 (19-21) Coded/Replicate No. —

Date 8/7/97 Time of Sampling: Begin 1230 End

Weather Sunny 80's

Site Description 1/2 WAY BETWEEN MW-30 & MW-28 ON SIDE ACCESS ROAD NEXT TO FENCE

SAMPLING DATA

Collection Method Split spoon

Depth 19-21 Moisture Content Moist

Color light brown (5YR5/6) w/ some med brown mottling (5YR4/4) Odor —

Description CLAY, stiff (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

OVM - ND

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

9/7/7/10

Sampler(s) J. Hughes

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 1

Site Location Sloss Industries, Birmingham, AL Location Name: 38-SB MW-30 S?D

Sample I.D. No. 970807 -LD- 38 -SL 0030 (9-11) Coded/Replicate No. —

Date 8/7/97 Time of Sampling: Begin 915 End

Weather

Site Description AT MW-30 S?D ± 5 FT E of PAIR

SAMPLING DATA

Collection Method Split spoon

Depth 9-11 Moisture Content DRY

[Col]or LIGHT BROWN 5 YR 5/6 Odor —

Description CLAY, STIFF (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

OVM-ND

[Rem]arks Non VOC's Composited in stainless steel bowl with stainless steel spoon

10/6/10/14

Sampler(s) J. Hughes

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 2 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: ~~SB~~ 38 - MW-30 S&D

Sample I.D. No. 970807-LD-38-SL0030 (~~18-19~~) 17-19 JU Coded/Replicate No.

Date 8/7/97 Time of Sampling: Begin 1000 End

Weather SUNNY 80'S

Site Description AT MW-30 S 5 FT EAST OF PAIR

SAMPLING DATA

Collection Method Split spoon

Depth ~~18-20 ft~~ 17-19 Moisture Content MOIST

Color LIGHT BROWN 5YR 5/6 Odor —

Description CLAY, STIFF (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

OVM - ND

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

9/4/98

Sampler(s) J. Hughes

Southprint 89-1093

GERAGHTY
& MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 1

Site Location Sloss Industries, Birmingham, AL Location Name: 39-SBMW-32 (KT) 1/6/98

Sample I.D. No. 970805 -LD-39 -SL0032 (20-22) Coded/Replicate No. 970805-LD-39-SL9032

Date 8/ 5/97 Time of Sampling: Begin____ End____

Weather Sunny 80's

Site Description AT MW-32

SAMPLING DATA

Collection Method Split spoon

Depth ____ Moisture Content ____

r ____ Odor ____

Description

NO SAMPLE COLLECTED ONLY NON-NATIVE MATERIALS PRESENT

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

NO SAMPLE COLLECTED

arks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 1

Site Location Sloss Industries, Birmingham, AL Location Name: MW-33

Sample I.D. No. 970808 -LD-39 -SL 0033 (11-13) Coded/Replicate No.

Date 8/8/97 Time of Sampling: Begin 1525 End

Weather Overcast, 70's, drizzle to med rain

Site Description 1/2 WAY BETWEEN MW-32 & MW-34 ON WEST SIDE OF ROAD ON EAST SIDE OF SWMW39.

SAMPLING DATA

Collection Method Split spoon

Depth 11-13 Moisture Content DRY

Color LIGHT BROWN & PALE OLIVE (5YR6/4 , 10Y6/2) Odor —

Description CLAY, STIFF, w/ROUNDED PEBBLES (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

OVM - ND

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 1

Site Location Sloss Industries, Birmingham, AL Location Name: 39-SB MW-34 KT 1/6/98

Sample I.D. No. 970805 -LD- 39 -SL 0034 (10-12) KT 10-23-97 Coded/Replicate No. —

Date 8/5/97 Time of Sampling: Begin 1200 End

Weather Sunny 80's

Site Description At MW-34 ± 5 FT N of MW-34 D

SAMPLING DATA

Collection Method Split spoon

Depth 10-12 Moisture Content Moist

Color olive gray 5Y 3/2 Odor —

Description CLAY STIFF w/ some L.S. FRAGMENTS (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

21-9/11

Sampler(s) J. Hughes

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 1

Site Location Sloss Industries, Birmingham, AL Location Name: MW-35

Sample I.D. No. 970808 -LD-39 -SL0035(10-12) Coded/Replicate No. MW-35

Date 8/ 8 /97 Time of Sampling: Begin 1240 End

Weather OVERCAST 70'S OCCASIONAL

Site Description AT MW-35 PROPOSED LOCATION. APPROX 1/2 WAY DOWN ACCESS ROAD FROM MW-34S&D.

SAMPLING DATA

Collection Method Split spoon.

Depth 10-12 Moisture Content SLIGHTLY MOIST

Color GRAYISH ORANGE 10YR7/4 & LIGHT BROWN 5YR 5/6 MOTTLED Odor —

Description CLAY STIFF (CL)

Analyses Required

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

 89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: ~~MW-36~~ 39-SBMW36 KT 1/6/98

Sample I.D. No. 970804 -LD-~~38~~ 39 -SL0036 (5-7) KT 10-28-97 Coded/Replicate No. 970804-LD-38-SL9036 970804-LD-38-SL0036 MS/MSD

Date 8/04/97 Time of Sampling: Begin 1400 End

Weather Sunny 90's

Site Description AT MW-36

SAMPLING DATA

Collection Method Split spoon

Depth 5-7 Moisture Content Moist

Color Mod Brown (5YR 4/4) w/ Very Dusky Red 10YR (2/2) Odor —

Description CLAY, plastic, w/ small rocks (CH)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

3|6|8|9

Sampler(s) J. Hughes

Southprint 89-1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: 39-SB MW-36 KT 1/6/98

Sample I.D. No. 9708 ~~08~~ 09 -LD-3~~8~~ 9 -SL0036(10-12) KT 10-23-97 Coded/Replicate No. —

Date 8/09/97 Time of Sampling: Begin 1930 End

Weather Sunny 90's

Site Description MW-36

SAMPLING DATA

Collection Method Split spoon.

Depth 10 - 12 Moisture Content Moist

Color Mod Brown (5YR 4/4) Odor —

Description Clay, plastic (CH)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

Southprint 89-1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 1 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: 8 MW-32

Sample I.D. No. 970808 -LD-38 -SL0037 (4-6) Coded/Replicate No. SPLIT w/GUARDIAN

Date 8/08/97 Time of Sampling: Begin 1100 End

Weather OVERCAST 70's OCCASIONAL LIGHT RAIN

Site Description AT SE END OF SWMU 38

SAMPLING DATA

Collection Method Split spoon

Depth 4-6 Moisture Content MOIST

Color LIGHT BROWN w/ PALE OLIVE MOTTLING Odor —

Description CLAY, STIFF (CL)

Analyses Required	Container Description From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz 1x4oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz 1LITER GLASS
Cyanide (9010)	1 x 8 oz

FOR GUARDIAN

Sample Monitoring (TIP, OVA, HNU, etc.)

OVM - ND

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

Southprint 89 1093

GERAGHTY & MILLER, INC.
Environmental Services

SOIL/SEDIMENT SAMPLING LOG

Project No. TF0320.015 Page 2 of 2

Site Location Sloss Industries, Birmingham, AL Location Name: MW-37

Sample I.D. No. 970808 -LD- -SL0037 (8-10) Coded/Replicate No.

Date 8/8/97 Time of Sampling: Begin 1040 End

Weather Overcast 70's w/occasional light rain

Site Description At SE end of SWMU 38

SAMPLING DATA

Collection Method Split spoon

Depth 8-10 Moisture Content Moist

Color Grayish orange w/ pale olive & light brown mottling (10YR 7/4, 10Y 6/2, 5YR 5/6) Odor —

Description Clay, stiff (CL)

Analyses Required	Container Description
	From Lab X or G&M
Priority Pollutant Metals & Barium (6010 & 7471)	1 x 4 oz
VOCs (8260)	1 x 8 oz
SVOCs (8270)	1 x 8 oz
Cyanide (9010)	1 x 8 oz

Sample Monitoring (TIP, OVA, HNU, etc.)

Remarks Non VOC's Composited in stainless steel bowl with stainless steel spoon

Sampler(s) J. Hughes

89 1093

VOLUME I

APPENDIX A.4

MONITOR WELL SAMPLE/CORE LOGS

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-21 Project/No. Sloss Industries / TF0320.015 Page 1 of 2

Site Location Birmingham, AL Drilling Started 8/6/97 Drilling Completed 8/6/97

Total Depth Drilled 24 feet Hole Diameter 6 inches Type of Sample/Coring Device SPLIT SPOON

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 556.58 feet ☒ Surveyed ☐ Estimated Datum FT AMSL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Graves Service Company, Inc. Driller RON Helper JOHN/DWIGHT

Prepared By Joe Hughes Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	
0	2	1.0	3/8/12/9	CLAY, mod yellowish brown (10YR5/4) w/ light brown mottling (5YR5/6), stiff, dry, no odor (CL)	ND
2	4	0.25	3/3/3/4	NO RECOVERY/ ~~EX~~ CLAY AS 0-2 (CL)	ND
4	6	2.0	3/3/4/5	CLAY, mod brown 5YR4/4, w/ abundant sand, moist, plastic, no odor (CH)	ND
6	8	2.0	2/9/27/10	CLAY AS ABOVE, w/ DARK YELLOWISH BROWN (10YR4/2) SANDSTONE FRAGMENTS vf gr qtz & qtz sand, moist, no odor (CH)	
8	10	2.0	6/12/16/4	LIME ON TOP OF SPOON ALL ABOVE 8 IS MOST LIKELY FILL. CLAY, light brown (5YR5/6) w/ some light brown 5YR6/4 stiff, no odor (CL)	
10	12	2.0	8/6/9/12	CLAY AS 8 TO 10 (CL)	
12	14	2.0	9/10/11/12	CLAY AS 8 TO 10 (CL)	

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-21 Page 2 of 2

Prepared By Joe Hughes

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	
* 14	16	2.0	4/4/4/4	CLAY AS 8-10	ND
16	18	2.0	6/6/5/8	CLAY AS 8-10 w/ more light brown 5YR6/4	ND
18	20	2.0	4/6/3/6	CLAY AS 8-10	ND
* 20	22	2.0	8/10/14/16	CLAY, AS 8-10, w/ some laminations like	ND
				original bedrock	
* 22	24	0.25	18/36/50/3	CLAY, AS 20-22	
8 24	26		50/0	ROCK AT 23.5 CLAY IN TOP OF SPOON ; is	
16				SATURATED - H_2O ON TOP OF ROCK	
14				AUGER REFUSAL AT 23.5	

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well PMW-21 Project/No. Sloss Industries / TF0320.015 Page 1 of 1

Site Location Birmingham, AL Drilling Started 8/8/97 Drilling Completed 8/9/97

Total Depth Drilled 42 feet Hole Diameter 10" inches Type of Sample/Coring Device CUTTINGS

Length and Diameter of Coring Device NA Sampling Interval — feet

Land-Surface Elev. 556.58 feet ☒ Surveyed ☐ Estimated Datum FT AMSL

Drilling Fluid Used POTABLE H2O Drilling Method AIR ROTARY / HAMMER

Drilling Contractor Graves Service Company, Inc. Driller JOHN MITCHELL Helper DWIGHT PRUIT

Prepared By Joe Hughes Hammer Weight — Hammer Drop — inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	23.5			SEE HOLLOW STEM AUGER LOG
23.5	28.25	FROM CUTTINGS		LIMESTONE, FRACTURED, HARD
28.25	29.5	ROTARY/AIR		LIMESTONE, MOD HARD, FRACTURED W/ CALCITE FILLED VEINS
29.5	30.25			CLAY W/ LIMESTONE
32	33.75			LIMESTONE, FRACTURED FROM 31.75 TO 32, HARD
33.75	34.75			LIMESTONE, MOD, W/ CLAY
34.75	36.75			LIMESTONE, FRACTURED, HARD
36.75	37.75			LIMESTONE, MEDIUM HARD
37.75	42			LIMESTONE, FRACTURED, HARD
				STOP FOR NIGHT 8/7/97
				TD 42

GERAGHTY & MILLER, INC.
Environmental Services

MW-22 JH 12/19/97

SAMPLE/CORE LOG

Boring/Well ~~P-31~~ Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 1

Site Location BIRMINGHAM ALABAMA Drilling Started 7-18-95 1200 Drilling Completed 7-18-95 1210

Total Depth Drilled ~2.0 feet Hole Diameter 7 1/4" inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 2' x 2" Sampling Interval Continuous feet

Land-Surface Elev. 625.70 feet ☒ Surveyed ☐ Estimated Datum MSL (KP 2/6/96)

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor GRAVES SERVICES Co. Driller Ron Helper Hal

Prepared By J. KIRKPATRICK Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	2		50/0	SANDSTONE, white, fine to medium grained, weathered (friable), poorly cemented, becomes hard at 2 ft bls. (made 3 attempts to penetrate rock. Augered through 2 ft of highly weathered S.S - then had spoon refusal on one attempt. - Couldn't penetrate rock on other two attempts.)

Jason Kirkpatrick 7-18-95

333

JH 2/19/97

000164

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

EW-22 JH 12/19/97

Boring/Well ~~B-3+~~ Project/No. TF0320.013 Page 1 of 2

Site Location SLOSS, BIRMINGHAM, ALABAMA Drilling Started 7/19/95 Drilling Completed 7/20/95

Total Depth Drilled 119 feet Hole Diameter 6 1/8 inches Type of Sample/Coring Device —

Length and Diameter of Coring Device — Sampling Interval — feet

Land-Surface Elev. 625.70 feet ☒ Surveyed ☐ Estimated Datum MSL (KD 2/6/96)

Drilling Fluid Used APPROX. 150 GAL H_2O Drilling Method AIR ROTARY

Drilling Contractor GRAVES Driller JOHN M. Helper JB/DWIGHT P.

Prepared By J. HUGHES Hammer Weight — Hammer Drop — inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	8.5	AIR ROTARY 6" HOLE		SAND STONE, LIGHT BROWN (5YR 6/4) HARD-SOFT,
				W/HEMATITE CMT & CHERT FRAGMENTS (TO 2FT - F?), WEATHERED AT SURFACE
				WELL ROUNDED QTZ SND, MODERATE SORTING, DRY, VF GR
8.5	9			CLAY, LIGHT BROWN (5YR 6/4), DRY
9	13.5			SANDSTONE AS 0-8.5, HARD
13.5	22.75			CLAY (SANDY), LIGHT BROWN (5YR 6/4) W/TRACE
				SAND STONE AT 14.0-16
22.75	28.5			SANDSTONE STRINGERS, LIGHT BROWN (5YR 6/4), HARD,
				VFGR, HEMATITE CMT, IN CLAY MATRIX, LIGHT
				BROWN (5YR 6/4), HARD, DRY
28.5	36			SHALE (CLAYEY), LIGHT GRAY (N7), NON FISSLE,
				SLIGHTLY DAMP, SOME LIGHT BROWN (5YR 6/4) SHALE/CLAY
				& LIGHT BROWNISH GRAY SHALE CLAY (5YR 6/1)
				S.S. STRINGER AT 34.75-35
36	72			SHALE/CLAY, MEDIUM GRAY (N5), HARD, SLIGHTLY
				FISSLE, SLIGHTLY MOIST
				SOFT SPOT 52.5-52.75
72	72.5			BLACK SILT (LIKE COAL)
72.5	76	AIR ROTARY 6"		SHALE, AS 36-72

334

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~R34~~ MW-22 JH 12/19/97 Project/No. TF0320.013 Page 2 of 2

Site Location SLOSS-BIRMINGHAM, ALABAMA Drilling Started 7/19/95 Drilling Completed 7/20/95

Total Depth Drilled 119 feet Hole Diameter 2 1/8 inches Type of Sample/Coring Device —

Length and Diameter of Coring Device ___ Sampling Interval — feet

Land-Surface Elev. 625.70 feet KB 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used APPROX 150 GAL H_2O Drilling Method AIR ROTARY

Drilling Contractor GRAVES Driller JOHN M Helper JB/DWIGHT ?

Prepared By J. HUGHES Hammer Weight — Hammer Drop — inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
76	83	AIR ROTARY 6"		CLAY (SHALE, LIGHT BROWN (5YR 6/4), HARD, DRY
83	102			SANDSTONE, MODERATE BROWN (5YR 4/4), VF-FN GR
				QTZ SAND, MOD ROUNDED & SORTED, HEMATITE CEMENT
				W/ CLAY AS 76-83, DRY
				SOFT SPOT 86.75 – 88.25
102	104.5			SILTSTONE ~~TO~~ SANDSTONE, MODERATE BROWN (5YR 4/4)
				≤ VF-F GR QTZ SAND, MODERATE ROUNDED & SORTED,
				HEMATITE CEMENT, W/ MINOR LIMESTONE W/ COARSE
				CALCITE FILLING BURROWS/CASTS OR INTRACLASTS.
104.5	109.5			LIMESTONE, MEDIUM GRAY (N5), HARD W/ FRACTURES (107-108)
				W/ CALCITE FILLED VEINS & SOME SILTSTONE/SANDSTONE (BROWN)
109.5	112			CLAY, SOFT, W/ HARD STRINGER AT 111.5
113	114.5			SHALE/CLAY, MED GRAY (N5), NON FISSILE
114.5	119	AIR ROTARY 6"		LIMESTONE, MEDIUM GRAY (N5), W/ CALCITE FILLED
				VEINS/FRACTURES, HARD, FRACTURED IN SPOTS (?)
				FOSSILS: BRANCHING BRYOZOAN, CRINOID STEM COLONIES (50.5mm)
				*AFTER DRILLING TO 119 FT BLS & LETTING BORE HOLE
				SET FOR 15 MIN DTW = ± 108 FT BLS
				POSSIBLE WATER BEARING ZONES AT 107-109 & 114.5-119
				SCREENED TO 108.5 SAND TO 106.5 JH 12/19/97

335

000478

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-30~~ MW-23 JH 12/19/97 Project/No. TF0820013 SLOSS INDUSTRIES Page 1 of 2

Site Location BIRMINGHAM ALABAMA Drilling Started 7-18-95 1515 Drilling Completed ~~7-18-95~~ 7-19-95 0930 JWK 7-19-95

Total Depth Drilled 38 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 2' x 2" Sampling Interval Continuous feet

Land-Surface Elev. 632.94 feet (KT) 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor GRAVES SERVICE Co. Driller Ron Helper Hal

Prepared By J. KIRKPATRICK Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	OVM
0	2	24"	12/13/14/15	CLAY, mottled mod. reddish brown (10 R 4/6) and pale yellowish orange (10 YR 8/6), stiff, dry, no odor (CH)	0.0
2	4	18"	12/21/19/18	CLAY, pale yellowish orange (10 YR 8/6) w/ mod. reddish brown streaks, dry, stiff, no odor. (CH)	0.0
4	6	22"	16/21/22/25	CLAY, w/ silt, pale yellowish orange (10 YR 8/6) w/ mod. reddish lenses, dry to damp, hard but breaks apart. Some highly weathered S.S. (fine grain), no odor (ML)	0.0
6	8	22"	28/30/28/24	CLAY, silty, pale yellowish orange (10 YR 8/6), hard but crumbles easily, dry, no odor. (ML) or (CL)	0.0
8	10	24"	4/4/5/7	CLAY, silty, pale yellowish orange (10 YR 8/6) w/ mod. reddish brown (10 R 4/6) streaks, medium stiff, crumbles easily, damp, no odor (ML) or (CL)	0.0
10	12	22"	6/10/12/14	CLAY, some silt, "marbled appearance" – pale yellow orange and light gray (N7), medium stiff, cohesive, damp, no odor. (CL)	0.0
12	14	20"	10/18/17/25	CLAY, pale yellowish orange (10 YR 8/6) and thin mod. reddish orange streaks, looks like weathered lime	0.0

336

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-23 ~~P-30~~ JH 12/19/92 Page 2 of 2

Prepared By J. KIRKPATRICK

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	OVM
				stone (but the color's wrong), medium stiff to	
				stiff, damp to dry, no odor (CL)	
14	16	24"	5/6/12/10	CLAY, silty, pale yellowish orange + light gray	0.0
				color, stiff, dry, no odor.	
				(CL)	
16	18	11"	4/14/21/28	CLAY, as above. (CL)	0.0
18	20	24"	8/18/25/22	CLAY, silty and fine sand, pale yellowish orange	0.0
				(10 YR 6/6) w/ black (Mn) streaks (3" zone in middle)	
				stiff, damp to dry, no odor. (CL)	
20	22	0"	13/26/27/25	No recovery - lost shoe on spoon.	NA
22	24	24"	2/8/10/16	CLAY, dark yellowish orange (10YR 6/6) w/ light brown	0.0
				(5 YR 5/6) streaks, thinly bedded, (vertically), med.	
				stiff, damp, no odor (OH)	
24	26	22"	8/10/11/12	CLAY, pale yellow orange (10 YR 8/6) and dark yellow orange (10 YR 6/6)	0.0
				thinly bedded (vertical), medium stiff, damp	
			soft refusal	no odor. (OH).	
26	28	18"	6/19/50/5"	CLAY, shades of yellowish and reddish orange,	0.0
				some bedding (vertical), med. stiff to hard, damp	
			refusal	to dry, no odor (OH) some "shale like" fragments in cuttings	
28	30	9"	21/50/3"	CLAY, mod. reddish brown (10 R 4/6), some very	0.0
				pale orange (10 YR 8/2), some bedding, (vertical)	
				very stiff to hard, dry, no odor. (OH)	
				SPOON REFUSAL - 27.0 and 28.5.	

337

G&M Form 04 6-86 NO AUGER REFUSAL (DOWN TO 32' bls VERY HARD) Southport 87-1719

000162

GERAGHTY & MILLER, INC.
Environmental Services JH 12/19/97

SAMPLE/CORE LOG

Boring/Well P-30 MW-23 Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 1

Site Location BIRMINGHAM ALABAMA Drilling Started 7-27-95 0800 Drilling Completed 7-27-95 1045

Total Depth Drilled 79.0 feet Hole Diameter 6" inches Type of Sample/Coring Device None

Length and Diameter of Coring Device 2' x 2" Sampling Interval None feet

Land-Surface Elev. 632.94 feet KT 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used AIR Drilling Method AIR ROTARY

Drilling Contractor GRAVES SERVICE CO. Driller DWIGHT PRUITT Helper J. BUTLER

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	30			SEE LITHOLOGY LOG FOR HSA O.B. DRILLING.
				Reddish brown clay and weathered shale.
30	38	AIR ROTARY 6" Roller Cone		CLAY (possibly highly weathered shale), mod. reddish
				brown (10 R 4/6), dry. Easy drilling
38	53			CLAY OR SHALE (highly weathered), some evidence of thin
				bedding, medium gray (N5), dry to damp. Smooth drilling
53	55			CLAY or SHALE, (highly weathered), ~~pale~~ grayish
				orange (10 YR 7/4), bit is cutting smoothly
55	57			SANDSTONE, weathered, light brown (5 YR 5/6)
				well rounded, hard, medium to fine grained.
57	79			SHALE (or CLAY), medium gray (N5), weathered
				smooth drilling but hit an occasional hard spot (≈1'
				thick) throughout formation. Hard spots are
				SANDSTONE, fine grained, medium gray, hard and
				SHALE, hard, medium gray. Making water at ~76 ft
		79 –	TOTAL	DEPTH bls. (~1 gpm or better)

[signature] 7-27-95

GERAGHTY & MILLER, INC.
Environmental Services

MW-24 Jd 12/19/97

SAMPLE/CORE LOG

Boring/Well P-29 Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 2

Site Location BIRMINGHAM ALABAMA Drilling Started 7-18-95 0815 Drilling Completed 7-18-95 1000

Total Depth Drilled 20 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device Split Spoon

Length and Diameter of Coring Device 2' x 2" Sampling Interval Continuous feet

Land-Surface Elev. 591.98 ~~612.83~~ feet KT 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor GRAVES SERVICE CO. Driller Ron Helper Hal

Prepared By J. KIRKPATRICK Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	OVM
0	2	20"	12/16/9/11	CLAY, moderate reddish orange (10 R 6/6) w/ pale yellowish orange (10 YR 8/6) blebs, very stiff (cohesive), dry to damp, chert fragments (broken) throughout spoon, no odor (CL)	0.0
2	4	22"	12/18/36/46	CLAY w/ broken chert, clay is moderate reddish orange (10 R 6/6) yellowish orange (10 YR 6/6) blebs, very stiff, Chert fragments throughout spoon and bottom 3" is all broken chert (crumbled), spoon is dry to damp, no odor (CL)	0.0
4	6	24"	18/7/9/10	CLAY, color as above, more clay less chert but still has chert throughout, damp to dry, very stiff, no odor. (CL)	0.0
6	8	22"	11/10/11/11	CLAY, mod. reddish orange (10R 6/6) w/ yellowish blebs + black (N1) streaks, chert rubble throughout, very stiff, damp to dry, no odor (CL)	0.0
8	10	24"	7/10/11/11	CLAY, mod. reddish orange (10 R 6/6) w/ 4" lense of mottled orange and light greenish gray (5 GY 8/1), orange clay has chert frag., grayish lense is clean clay, layered (like shale), entire	0.0

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG (Cont.d)

Boring/Well ~~P-27~~ MW-24 JH 12/19/97 Page 2 of 2

Prepared By J. KIRKPATRICK

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	OVM
				spoon is very stiff, damp, no odor. (CL)	
10	12	24"	~~4/5/6/15~~ missed	CLAY, mod. reddish orange (10 R 6/6), w/	0.0
				Chert fragments, very stiff, damp, no	
				odor (CL)	
12	14	24"	4/5/6/15	CLAY, mod. reddish orange (10 R 6/6) w/ light	0.0
				greenish gray (5 GY 8/1) lenses, bedded (weathered)	
				very stiff, ~~some~~ trace chert fragments, soft	
				wet zone (2") in middle, damp, no odor (CL)	
14	16	20"	10/23/25/33	CLAY, mod. reddish orange (10 R 6/6), hard,	0.0
				(looks like weathered (highly) rock, bedded (vertical)	
			Refusal	dry to damp, no odor (CL)?	
16	18	8"	25/36/50/5"	CLAY, mod. reddish orange (10 R 6/6) w/ dark gray	0.0
				(N3) lenses (thin), appears bedded (vertical)	
		Refusal		(like a weathered rock), hard, dry, no odor	
18	20	4"	50/4"	CLAY, as above, appears to be weathered rock	0.0
				(shale)	
			SPOON	REFUSAL - 18.0	
			NO AUGER REFUSAL -		
				Jason Kirkpatrick 2-18-95	

340

000159

GERAGHTY & MILLER, INC.
Environmental Services

MW-2d 3ft 12/19/97

SAMPLE/CORE LOG

Boring/Well ~~P-29~~ Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 1

Site Location BIRMINGHAM ALABAMA Drilling Started 7-25-95 1320 Drilling Completed 7-25-95 1630

Total Depth Drilled 76.0 feet Hole Diameter 6" inches Type of Sample/ Coring Device None

Length and Diameter of Coring Device NONE Sampling Interval None feet

Land-Surface Elev. ~~591.81~~ ~~617.88~~ feet (KT) 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used AIR Drilling Method AIR ROTARY/HAMMER

Drilling Contractor GRAVES SERVICE CO. Driller Dwight Pruitt Helper J. BUTLER

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	20	HSA		SEE O.B. LITHOLOGY LOG FOR P-29. (CLAY)
20	21	AIR ROTARY [illegible] core bit		CLAY, reddish brown, dry (10 R 3/4)
21	29			CLAY OR SHALE, highly weathered (like clay) medium dark gray (N4), dry, ~~hard~~ — larger chunks are thinly bedded like a shale but ~~fairly~~ not very hard.
29.0	54.5			SHALE, weathered to highly weathered, olive black (5 Y 2/1), dry, cuts smoothly w/ roller bit, larger cuttings are hard (but not like a rock)
54.5	66.75			SHALE, weathered, olive black (5 Y 2/1), dry, harder than shale above, bit is bouncing.
* 66.75	69.0	AIR HAMMER FROM 68'		SHALE, olive black (5 Y 2/1), hard, slow drilling
69	76			SANDSTONE, medium gray (N5) w/ some black flecks, very hard, crystaline, medium grained, Cuttings are damp - water suspected to be just above the hard rock (SHALE) at ~67 Ft.

Jason Kirkpatrick
7-25-95

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-28 D~~ MW-25S (JK) 7-25-95 Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 1

Site Location BIRMINGHAM ALABAMA Drilling Started 7-13-95 0810 Drilling Completed 7-13-95 1045

Total Depth Drilled 20.0 feet Hole Diameter 7 1/4" inches Type of Sample/Coring Device Split Spoon (Steel)

Length and Diameter of Coring Device 2' x 2" Sampling Interval Every 5 feet

Land-Surface Elev. 556.76 (JK) 7/6/95 feet ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor GRAVES SERVICE CO. Driller Ron Helper Hal

Prepared By J. KIRKPATRICK Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	OVM
				SEE LITHOLOGY LOG FOR P-28D FOR DETAILED	
				LITHOLOGIC DESCRIPTIONS	
3	5	18"	8/6/6/5	SILT + SAND, dark reddish brown (10 R 3/4), none	0.0
				cohesive, loose, dry, overlying CLAY	
				CLAY is dark yellowish orange (10 YR 6/6),	
				medium stiff, damp to dry, no odor	
				(CL)	
8	10	14"	2/1/1/2	SILT(Y) fill material, bluish white (5 B 9/1)	0.0
				soft, damp to wet, sewer odor,	
13	15	14"	4/1/1/2	SILT(Y) fill material, bluish white (5 B 9/1)	0.0
				very soft w/ air bubbles, wet, sewer odor,	
18	20	16"	3/5/9/13	Mostly SILT(Y) Fill material as above (probably	
				from inside the augers) Tip of Spoon has	
				some yellowish brown clay (10 YR 5/4)	-
				SHELBY TUBE — 23.0 to 24.5 (Refusal at 24.5 ft)	

Jack
7-13-95

(JH) 12/19/97

342

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

JDuel(sky?) MW-25S (JH) 7-25-95

Boring/Well ~~P-25S~~ Project/No. TF0320.013 Page 1 of 1

Site Location SUSS - BIRMINGHAM, ALABAMA Drilling Started 7/14/95 Drilling Completed 7/18/95

Total Depth Drilled 46 feet Hole Diameter 6 inches Type of Sample/Coring Device —

Length and Diameter of Coring Device — Sampling Interval — feet

Land-Surface Elev. 556.76 ~~55_.__~~ feet (JH) 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used 50 GAL OF H_2O Drilling Method AIR ROTARY/HAMMER

Drilling Contractor GRAVES Driller JOHN M. Helper JB/DWIGHT

Prepared By J. HUGHES Hammer Weight — Hammer Drop — inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	28	HSA		SEE HSA LOGS FOR LITHOLOGY/DESCRIPTION
28	32	AIR ROTARY/		ROCK, (CHERT, S.S, & L.S), W/ SOFT SPOTS & BROKEN SPOTS)
		10" HOLE		(HARD SPOTS ARE LESS THAN 1 FOOT THICK)
				SURFACE CASING SET TO 32FTBLS
32	46	AIR ROTARY ~~HAMMER~~		LIMESTONE, MED GRAY (N5), W/ ABUNDANT COARSE
		6" HOLE		CALCITE CRYSTALS FILLING FRACTURES/VEINS - FRACTURED
				45.75 HARD, UNFRACTURED L.S.
				FROM AIR ROTARY/BIT
~~22~~23	24			BROKEN ROCK, C.S. W/CALCITE VEINS
24	25			L.S. HARD W/ CALCITE VEINS
25	26.5			L.S., BROKEN W/CALCITE VEINS
26.5	27			CLAY + L.S W/MINOR SAND & CHERT
27	31			BROKEN L.S. W/CALCITE VEINS POTENTIAL H_2O BEARING
31	34.75			L.S, BROKEN, W/SOFT SPOTS ZONE.
34.75	35.25			L.S., HARD, W/CALCITE VEINS
35.25	37			SOFT BROKEN L.S.
37	44			ALTERNATING HARD & SOFT L.S.

(JH) 12/19/97

000153

GERAGHTY & MILLER, INC. Environmental Services

SJD 12/19/97
7-25-95

SAMPLE/CORE LOG

Boring/Well MW-250 ~~P-28S~~ D (KP) Project/No. TF0520013 SLOSS INDUSTRIES Page 1 of 2

Site Location BIRMINGHAM ALABAMA Drilling Started 7-12-95 1130 Drilling Completed 7-12-95 1715

Total Depth Drilled 28.0 feet Hole Diameter 7¼ inches Type of Sample/Coring Device Split Spoon.

Length and Diameter of Coring Device 2' x 2" Sampling Interval Continuous feet

Land-Surface Elev. 556.87 feet (KP) 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor GRAVES SERVICE CO. Driller RON Helper HAL

Prepared By J. KIRKPATRICK Hammer Weight 140 Hammer Drop 30 inches

	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	OVM
FILL MATERIAL	0	2	18"	10/9/23/15	SILT + SAND, dark yellowish brown, (10YR 4/2) non-cohesive, loose, dry, no odor ~~(SM)~~ kt 2/6/96	0.0
	2	4	18"	10/8/11/8	SILT + SAND, dark yellowish brown (10YR 4/2) non-cohesive, loose, dry, no odor. ~~(SM)~~ kt 2/6/96	0.0
	4	6	16"	6/5/4/4	SILT and SAND, as above ~~(SM)~~ kt 2/6/96	0.0
	6	8	12"	1/2/1/1	SILT, trace sand, bluish white (5 B 9/1), semi-cohesive, soft, damp to wet, no odor (Appears similiar to the piles of white Sloss debris around the drilling area)	0.0
	not actually silt but the closest geologic term that fits.					
	8	10	20"	2/2/2/2	SILT, trace sand, bluish white, (5 B 9/1) as above	0.0
	10	12	24"	1/2/2/1	SILT(Y) fill material w/ trace sand (?) as above.	0.0
	12	14	24"	5/5/1/2	SILT (Y) fill material, as above, wet	0.0
	14	16	24"	2/3/5/3	SILT(Y) FILL Material, as above, more plastic	0.0
	16	18	24"	2/2/3/2	SILT (Y) FILL Material, soft, w/ air bubbles, plastic, bluish white (5 B 9/1), wet, no odor	0.0
BAD SPOON	~~18~~	~~20~~	~~24"~~	~~2/1/2/3~~	~~SILT(Y) FILL Material, as above, wet, sewer odor~~	~~0.0~~ JWK

344

GERAGHTY & MILLER, INC.
Ground-Water Consultants

JH 12/8/92
MW-25D
7-25-95

SAMPLE/CORE LOG (Cont.d)

Boring/Well ~~P-28S~~

Prepared By J. KIRKPATRICK

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	OVM
18	20	21"	5/9/10/14	CLAY, pale yellowish orange (10 YR 8/6) medium stiff, trace white limestone rubble, damp, sewer odor (CL)	0.0
20	22	18"	9/18/12/19 (CL)	CLAY, some coarse limestone rubble (white) clay is mottled greenish gray (5 G 6/1) and dark yellowish orange (10 YR 4/6), medium stiff, damp, sewer odor	0.0
22	24	14"	4/4/4/8	CLAY, some limestone rubble (weathered) (white), clay is mottled color as above, medium stiff, ~~damp~~ wet, sewer odor.	0.0
24	26	24"	5/17/29/24	CLAY, w/ limestone rubble (gravel size chunks) mostly olive gray (5 Y 4/1), stiff, damp, sewer odor.	0.0
26	28	12"	Refusal 25/50/5"	CLAY w/ limestone rubble (gravel size broken L.S. w/ calcite), clay is olive gray (5 Y 4/1), appears layered like a shale (may be highly weathered shale), very stiff to hard, dry, no odor, (CL).	0.0
			SPOON	REFUSAL - 27 ft bls.	
			AUGER	REFUSAL - 28 ft bls.	

7-12-95

JK 12/9/97

G&M Form 04 6/86

Southprint 87 1719

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

MW-25D 12/19/97

Boring/Well ~~P-28D~~ Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 2

Site Location BIRMINGHAM ALABAMA Drilling Started 7-24-95 0800 Drilling Completed 7-26-95 1320

Total Depth Drilled 67.0 feet Hole Diameter 6 inches Type of Sample/Coring Device None

Length and Diameter of Coring Device 2' x 2" Sampling Interval None feet

Land-Surface Elev. 556.37 feet (KD 2/6/96) ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used AIR Drilling Method AIR HAMMER/ROTARY

Drilling Contractor GRAVES SERVICE CO. Driller DWIGHT PRUITT Helper J.B

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	28	HSA		SEE O.B. LITHOLOGY LOG FOR P-28S.
22	44			SEE LITHOLOGY LOG FOR P-28S (ROCK LOG)
23.0	24.0	9 7/8" Roller Cone bit		LIMESTONE, broken, weathered, gray w/ calcite
24.0	25.0			LIMESTONE, hard, gray.
25.0	27.5			LIMESTONE, broken + weathered, clayey zones, gray (N5), calcite veins noted.
27.5	29.0 ~~31.0~~			LIMESTONE, broken, gray w/ calcite veins.
29.0	31.0			LIMESTONE, hard, gray - hard drilling, competent rock.
		31' - BOTTOM OF 6" STEEL SURFACE CASING.		
31	37			LIMESTONE, broken, weathered, some calcite, medium light gray (N6), medium hard, dry.
37	39			CLAY, medium light gray (N6), damp.
39	44			LIMESTONE, broken, weathered, medium light gray (N6), hard to medium hard.
44	63			LIMESTONE and CLAY (OR WEATHERED SHALE) in lenses about 1 to 2 ft thick throughout this zone. LIMESTONE is broken and weathered, medium

346

000150 12/3/97

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG (Cont.d)

Boring/Well ~~P-28D~~ MW-25D JK 12/19/97

Page 2 of 2

Prepared By J. KIRKPATRICK

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
				gray (N6) w/ some calcite. CLAY (weathered shale)
				is medium gray also, smoother drilling, damp to
				~~wet~~ wet JK
63	64			LIMESTONE, hard, medium light gray (N6)
				competent.
64	67			LIMESTONE, broken, weathered w/ calcite
				throughout, medium light gray (N6), medium
				hard to hard, wet.
		67	TOTAL DEPTH	

Jason Kirkpatrick
1-26-95

JK 12/19/97

Southprint 87-1719

000157

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-27~~ MW-26 JH 12/19/97 Project/No. SLOSS TF0320.013 Page 1 of 2

Site Location SLOSS - BIRMINGHAM Drilling Started 6/12/95 Drilling Completed 6/12/95

Total Depth Drilled 22.8 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device S/S

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONT feet

Land-Surface Elev. 547.41 feet KB 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used —— Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONALD

Prepared By J. HUGHES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	TID
0	2	1	11/7/7/6	CLAY, MOTTLED DUSKY BROWN & LIGHT BROWN, STIFF, w/ ls gravel & organics, DRY, NO ODOR (CL)	ND
2	4	1	4/6/7/10	CLAY, MODERATE BROWN, w/ DARK YELLOWISH BROWN BLEBS, STIFF, DRY, NO ODOR (CL)	ND
4	6	1	5/4/5/8	Same as 2-4, DRY, NO ODOR	ND
6	8	1.25	4/7/8/10	CLAY, MOTTLED, DARK YELLOWISH ORANGE → VERY PALE ORANGE, STIFF, w/ MINOR BLACK BLEBS, DRY, NO ODOR (CL)	ND
8	10	1.5	5/7/8/10	CLAY, GRAYISH ORANGE, w/ BLOCK MOTTLING, STIFF, DRY, NO ODOR (CL)	ND
10	12	1.5	7/11/13/12	SAME AS 8-10, MOIST, NO ODOR	ND
12	14	1.5	3/5/5/3	CLAY, GRAYISH ORANGE, w/ LIGHT BROWN MOTTLING, STIFF, SATURATED, NO ODOR w/ SOME CHERT GRAVEL (CH)	ND

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-27~~ MW-26 JU 12/19/97 Project/No. SLOSS TF-320.013 Page 2 of 2

Site Location SLOSS, BIRMINGHAM, ALABAMA Drilling Started 6/12/95 Drilling Completed 6/12/95

Total Depth Drilled 22.8 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device S/S

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONT feet

Land-Surface Elev. 547.41 feet KT 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used —— Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONALD

Prepared By J. HUGHES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	TIP
14	16	1.5	8/7/14/43	CLAY SAME AS 12-14, SATURATED (6") OVERLYING CLAY, MODERATE YELLOWISH BROWN, COHESIVE, W/ LS FRAGMENTS, DRY, NO ODOR - WEATHERED SURFACE (CL)	ND
17	19	0.5	6/9/11/14	CLAY, DARK YELLOWISH ORANGE, STIFF, MOIST, NO ODOR (CH)	ND
19	21	1.0	21/45/50/5	CLAY SAME AS 17-19, SATURATED (6") OVERLYING SAME CLAY W/ L.S. FRAGMENTS (FINE GRAINED CRYSTALLINE L.S W/ COARSE CRYSTALS FILLING FRACTURES) (CL)	ND
22	~~23~~ 22.8	0.75	7/15/50/3	CLAY + LS. FRAGMENTS SAME 19-21	ND
				REFUSAL ON 2ND SPOON ON FIRST SET OF BLOW COUNTS	

000150 JD 12/19/97

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

PW-26 JH 12/19/97

Boring/Well P-27 Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 1

Site Location BIRMINGHAM ALABAMA Drilling Started 6-13-95 0900 Drilling Completed 6-14-95

Total Depth Drilled 141 feet Hole Diameter 8¼" 0 to 24' 5¾" 24-141 inches Type of Sample/Coring Device NA

Length and Diameter of Coring Device NA Sampling Interval Continuous from ~~cuttings~~ feet

Land-Surface Elev. 547.41 feet 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used Water Drilling Method Air Hammer

Drilling Contractor GRAVES SERVICES Co. Driller John Helper J.B / DWIGHT

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	22	—	—	SEE LITHOLOGY LOG FOR OVERBURDEN FOR P-27 BY JOE HUGHES.
22	30	Rock	chips	LIMESTONE, crystaline, medium light gray (N6) w/ calcite filled fractures (white N9) hard, dry.
30	40	Rock	chips	LIMESTONE, crystaline, medium light gray (N6) w/ calcite filled fractures, hard, dry.
49.7	55.5	Rock	chips / hammer action	LIMESTONE, light gray, softer, dry
55.5	74.5			LIMESTONE, medium light gray (N6), hard, calcite filled fractures, dry.
74.5	~~76.5~~ 83	JEK 8-21-95		LIMESTONE, as above
~~76.5~~ 83	91			SHALE (?), grayish brown, soft ~~LIMESTONE~~,
91	100			LIMESTONE, hard, medium dark gray (N4) numerous soft spots (~ ½ foot or less)
100	105			SHALE, grey brown, softer, moist.
105	135			LIMESTONE, dark medium gray (N4), hard occasional soft spot.
135	136			SHALE, brownish gray, soft. (potential water zone) most water produced here (¼ gpm
136	141			LIMESTONE, dark medium gray (N4), hard.

350

G&M Form 03 6/86

000151 JH 12/19/97

Southprint 89 1257

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-26~~ MW-27 JH 12/15/97 Project/No. TF0320.013 Page 1 of 2

Site Location SLOSS-BIRMINGHAM Drilling Started 6/13/95 Drilling Completed 6/13/95

Total Depth Drilled 24 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device S/S

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet

Land-Surface Elev. ~~552.02~~ 552.15 JH 12/15/97 feet KB 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used ______ Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONALD

Prepared By J. HUGHES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	TIP
0	2	1.0	9/7/5/3	water in hole CLAY, DARK YELLOWISH ORANGE, STIFF, SATURATED, NO ODOR W/ DUSKY BROWN MOTTLING & LS FRAGMENTS (RR. FILL) (CH)	ND
2	4	1.0	9/8/5/3	CLAY SAME AS 0-2 W/ 0.25' OF LIGHT BROWN CLAY, STIFF, ~~MOIST~~ SATURATED, AT BOTTOM OF SPOON (CH)	ND
4	6	1.5	5/10/10/11	CLAY, MODERATE TO DARK YELLOWISH ORANGE, STIFF, MOIST, NO ODOR W/ LT BROWN & BLACK MOTTLING (CH)	
6	8	1.25	9/12/13/19	CLAY SAME AS 4-6 W/ MINOR AMTS OF IRON CONCRETIONS, GRAVEL SIZE, DRY, NO ODOR (CL)	ND
8	10	1.5	11/10/14/14	CLAY, MOTTLED GRAYISH ORANGE TO VERY PALE ORANGE, STIFF, DRY, NO ODOR MINOR LIGHT BROWN MOTTLING (CL)	ND
10	12	1.5	12/14/18/23	CLAY, MOTTLED DARK YELLOWISH ORANGE & GRAYISH ORANGE, STIFF, DRY, NO ODOR, SOME BLACK SPECKS IN CLAY (SMALL IRON CONCRETIONS POSSIBLY) FN GR SND SIZE (CL)	ND
12	14	1.5	4/6/11/18	CLAY SAME AS 10-12 (CL)	N

351

000146 JH 12/15/97

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-26~~ MW-27 JH 12/15/97 Project/No. TF0320.013 Page 2 of 2

Site Location Sossu Birmingham Drilling Started 6/18/95 Drilling Completed 6/18/95

Total Depth Drilled 24 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device S/S

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet

Land-Surface Elev. ~~552.02~~ 552.15 JH 12/15/97 feet KT 2/6/96 [X] Surveyed [ ] Estimated Datum MSL

Drilling Fluid Used Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DENALD

Prepared By J. HUGHES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	TIP
14	16	1.0	5/4/15/16	CLAY, DARK YELLOWISH ORANGE, STIFF, MOIST, H_2S ODOR, W/ LS FRAGMENTS, FN GR CRYSTALLINE LS. (CL)	ND
16	18	1.75	19/18/18/19	CLAY, MOTTLED, ~~DARK~~ YELLOWISH ORANGE TO GRAYISH ORANGE, STIFF, ~~DRY~~, NO ODOR, W/ SOME BLACK FN GR. TO MED GR. SAND SIZED PARTICLES (IRON CONCRETIONS) (CL)	ND
18	20	1.5	4/3/4/6	CLAY SAME AS 16-18 W/ SOME LENSES OF CLAY LIGHT BLUISH GRAY, MOIST, NO ODOR (CH)	
20	22	1.75	1/1/2/3	SAME AS 18-20, MOIST, NO ODOR (CH)	ND
22	24	1.75	3/15/37/15/	CLAY SAME AS 20-22, SATURATED, NO ODOR, OVERLYING 0.75' OF FN GR CRYSTALLINE LS., BROKEN UP (CH)	ND
24	26		50	REFUSAL HAVE FOUND TOP OF ROCK SURFACE	
				TAKING SHELBY TUBE FROM 20 TO 23 FT BLS	

352

000147 JH 12/15/97

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-26~~ MW-24 JH 12/19/97 Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 1

Site Location BIRMINGHAM ALABAMA Drilling Started 6-13-95 1530 Drilling Completed 6-13-95 KP

Total Depth Drilled 37 feet Hole Diameter 6 9 3/4" to 25' to 37 inches Type of Sample/Coring Device NONE

Length and Diameter of Coring Device NONE Sampling Interval NONE feet

Land-Surface Elev. ~~552.07~~ 552.15 JH 12/15/97 feet KP 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used none or water Drilling Method AIR HAMMER

Drilling Contractor GRAVES ENVIRONMENTAL Driller John Helper Dwight / J.B.

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	23			SEE LITHOLOGY FOR 0-23 BY JOE HUGHES
23	23.8	Rock cuttings		LIMESTONE, fractured, soft, grey color.
23.8	28.15			LIMESTONE, medium gray, hard, crystaline.
				dry, many calcite filled fractures throughout.
28.15	29.00			LIMESTONE, dark yellowish brown (10 YR 4/2),
				weathered, softer, water bearing.
29.0	37.0			LIMESTONE, medium light gray (N6), hard,
				fractured w/ calcite filling.

Jason K... 8-29-9?

353

G&M Form 03 6 86 ~~000148~~ JH Southpoint 89 1257

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~F-25~~ MW-28 Jul 12/19/97 Project/No. TE0320.03 Page 1 of 2

Site Location SLOSS - BIRMINGHAM Drilling Started 6/13/95 Drilling Completed 6/13/95

Total Depth Drilled 18.5 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device S/S

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 556.44 feet (KT) 7/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used — Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONALD

Prepared By J. Hughes Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	TIP
0	2	1.5	10/7/5/7	CLAY, LIGHT BROWN, STIFF, DRY, NO ODOR W/ SOME ORGANICS (ROOTS) W/ 0.75' OF COAL (COKE) ON TOP OF SPOON (CL)	ND
2	4	1.5	3/5/8/13	CLAY SAME AS 0-2 W/ MINOR DARK YELLOWISH ORANGE MOTTLING, STIFF, DRY, NO ODOR (CL)	ND
4	6	1.5	9/14/14/17	CLAY SAME AS 2-4 W/ MINOR DARK YELLOWISH ORANGE & BLACK MOTTLING, STIFF, DRY, NO ODOR (CL)	ND
6	8	1.0	11/16/16/15	CLAY, LIGHT BROWN W/ MINOR DARK YELLOWISH ORANGE MOTTLING, STIFF, NO ODOR, MOIST S/S WAS MOIST ON OUTSIDE (CL)	ND
8	10	1.5	5/5/8/12	CLAY, OLIVE BLACK, STIFF, DRY, NO ODOR, OVERLYING CLAY, MOTTLED MODERATE BROWN TO DARK YELLOWISH ORANGE, STIFF, DRY, NO ODOR W/ SOME GRAVEL SIZED CONCRETIONS (CL)	ND
10	12	1.5	2/4/4/7	CLAY, MOTTLED MODERATE BROWN, DARK YELLOWISH ORANGE, & PALE BLUE, STIFF, DRY, NO ODOR (CL)	ND
12	14	1.9	11/11/12	CLAY SAME AS 10-12, STIFF, DRY, NO ODOR SUCTION SOUND PULLING S/S OUT OF HOLE (CL)	ND

354

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~B-25~~ MW-28 JH 12/19/97 Project/No. TF0320.013 Page 2 of 2

Site Location: SLOSS - BIRMINGHAM Drilling Started 6/13/95 Drilling Completed 6/13/95

Total Depth Drilled 18.5 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device S/S

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 556.44 feet (KT) 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used — Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONALD

Prepared By J. HUGHES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
14	16	1.75	3/5/5/5	CLAY SAME AS 12-14, STIFF, DRY→MOIST, NO ODOR
16	18	1.75	8/11/10/11	CLAY SAME AS 12-14, STIFF, DRY→MOIST (BOTTOM
				OF S/S), NO ODOR (CL — CH)
18	20		+ 50	.3" PENETRATION w/ 50 blows

T.P ND

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-25~~ MW-28 JU 12/19/97 Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 1

Site Location BIRMINGHAM ALABAMA Drilling Started 6-15-95 1100 Drilling Completed 6-15-95 1500

Total Depth Drilled 58.0 feet Hole Diameter 6 1/8 inches Type of Sample/Coring Device NONE

Length and Diameter of Coring Device NONE Sampling Interval NONE feet

Land-Surface Elev. 556.44 feet (K) 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used AIR / Drilling Method AIR HAMMER

Drilling Contractor GRAVES SERVICE CO. Driller JOHN M. Helper J.B/DWIGHT

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	~18	—	—	SEE O.B. LOG FOR LITHOLOGY FOR P.25 (BY JOE HUGHES)
16.5	18.5	Rock Chips + hammer action		Hard fractured LIMESTONE, light gray (N7)
18.5	19.0			CLAY, yellowish brown.
19.0	32.5			LIMESTONE, light gray (N7), hard, some fractures (?).
32.5	35.0			LIMESTONE, light gray (N7 to N6), medium hardness, (i.e. softer than above)
35.0	52.5			LIMESTONE, light gray (N7), hard w/ soft lenses (from 41' to 45'), some calcite (white N9) filled veins.
52.5	53.0			LIMESTONE, light medium gray (N6), soft, large calcite filled fractures (veins), water bearing zone.
53.0	58.0			LIMESTONE, light gray (N7), hard, small calcite filled veins, dry.
		58.0 - TOTAL DEPTH		

6-15-95 Jack

356

000175

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-29 Project/No. Sloss Industries / TF0320.015 Page 1 of 1

Site Location Birmingham, AL Drilling Started 8/7/97 Drilling Completed 8/7/97

Total Depth Drilled 19 feet Hole Diameter 6 inches Type of Sample/Coring Device SPLIT SPOON

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 561.86 feet ☒ Surveyed ☐ Estimated Datum AMSL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Graves Service Company, Inc. Driller RON Helper ALTON/DWIGHT/JOHN

Prepared By Joe Hughes Hammer Weight 140 Hammer Drop 30 inches

	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	
	0	3	AUGERS		COKE	ND
	3	5	AUGERS		CLAY AS 5-7	ND
	5	7	2.0	3/4/9/15	CLAY, light brown (5YR5/6), stiff, no odor, moist (CL)	ND
	7	9	2.0	15/24/22/20	FILL (?) CLAY HAD RELATIVELY FRESH GRASS IN IT	ND
FILL					CLAY, lightbrown (5YR5/6), stiff, w/COKE, MOIST, NO ODOR (CL)	
	9	11	2.0	3/4/6/10	CLAY w/ COKE IN IT. (CL) DARKER	ND
					COLOR TOP FOOT OF SPOON DUE TO COKE, STIFF, NO ODOR, MOIST	
	11	13	1.5	9/11/13/13	CLAY, light brown (5YR5/6), stiff, no odor, dry to moist (CL)	ND
	13	15	1.75	5/6/11/13	CLAY, lightbrown (5YR5/6), very stiff, dry, no odor (CL)	ND
1200 *	15	17	2.0	11/12/14/15	CLAY, lightbrown (5YR5/6) w/ medgray (N5) mottling, stiff, moist,	ND
					no odor (CL)	
	17	19	2.0	19/19/20/22	CLAY light brown (5YR5/6), stiff to plastic (at bottom)	ND
					dry to moist, no odor (CL-CH)	
1230 *	19	21	2.0	4/7/7/10	CLAY, as above, moist, no odor w/ some med brown (5YR4/4)	ND
					mottling (CH-CL)	
	21	23	0.5	19/50/3	CLAY AS ABOVE (0.25') + ROCK (L.S.) IN BOTTOM OF SPOON	ND
					(CL-CH	

357

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-29 Project/No. Sloss Industries / TF0320.015 Page 1 of 1

Site Location Birmingham, AL Drilling Started 8/12/97 Drilling Completed 8/12/97

Total Depth Drilled 26/36.5/38 feet Hole Diameter 8.75 \ 6" \ 4" inches Type of Sample/ Coring Device NA

Length and Diameter of Coring Device NA Sampling Interval NA feet

Land-Surface Elev. 56.86 feet ☒ Surveyed ☐ Estimated Datum FT AMSL

Drilling Fluid Used Potable H_2O + Air Drilling Method Air Rotary / Hammer

Drilling Contractor Graves Service Company, Inc. Driller John M. Helper Dwight / Alton / Ron

Prepared By Joe Hughes Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	21.5			See Hollow Stem Auger Log
21.5	22	Air Rotary	Cuttings	Limestone, Med Gray (N7), Broken, Hard
22	24.25			Limestone, Med Gray (N7), Hard + Clay
24.25	25.25			Limestone, Med Gray (N7), Hard
25.25	25.5			Clay
25.5	26			Limestone, Med Gray (N7) Hard
				Temporary Surface Casing Set at 26 ft bls
26	27	Air Hammer		Limestone Med Gray (N7) Hard
27	28			Cavity
28	29			Limestone, Med Gray (N7), Medium Hard
29	30.7			Limestone, Med Gray (N7), Hard w/ Calcite
30.7	31			Soft spot
31	36.5			Limestone, Med Gray (N7) w/ some Gray-Sh orange (10YR 7/4)
				Dolomitized Areas, Hard, w/ Abundant Calcite Filled
		Soft spot at 33		Veins (some quite large), + Structural Features (Slickensides)
				Dissolved appearance / Calcite Filled Veins Standing out
				in relief from fine grained ground matrix - implies higher
				relative flow rates)
36.5	38	4" Tricone		Limestone as 31 to 36.5
				Estimated Q of 6-12 GPM (Drillers Estimate)

358

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-255~~ (KP) MW-30S JH 12/19/97 Project/No. TF0320.013 Page 1 of 1

Site Location SLOSS BIRMINGHAM Drilling Started 6/14/95 Drilling Completed 6/14/95

Total Depth Drilled 17.5 feet Hole Diameter 7 1/4 inches Type of Sample/ Coring Device S/S

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONT feet

Land-Surface Elev. ~~564.60~~ 562.21 (KB) 2/6/96 feet ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used — Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONALD

Prepared By J. HUGHES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	TIP
3	5	1.25	8/4/8/8	CLAY, MODERATE BROWN w/ DUSKY YELLOWISH BROWN BROWN, STIFF, MOIST, NO ODOR, W/ SOME ORGANICS (CL)	2.5
8	10	1.25	8/7/13/18	CLAY, MOTTLED DARK YELLOWISH ORANGE, GRAYISH ORANGE, & BLACK, STIFF, DRY, NO ODOR + SOME GRAVEL (L.S.? & ROCK). (CL)	3.3
15	17.5			SHELBY TUBE	

~~000137~~ JH 12/15/97

G&M Form 02.6.86 Southpoint RQ 1257

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-24S~~ MW-30S JU 12/19/97 Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 1

Site Location BIRMINGHAM ALABAMA Drilling Started 6-20-95 1000 Drilling Completed 6-20-95 1230

Total Depth Drilled 35.0 feet Hole Diameter 8 3/4" 0-20.9 5 3/4"-20-35 inches Type of Sample/Coring Device NONE

Length and Diameter of Coring Device NONE Sampling Interval NONE feet

Land-Surface Elev. 562.21 ~~564.69~~ feet (KF 2/6/96) ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used AIR Drilling Method AIR HAMMER

Drilling Contractor GRAVES SERVICE CO. Driller JOHN MITCHEL Helper J.B / DWIGHT

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	20			SEE O.B. LITHOLOGY LOG (G+M - JOE HUGHES)
				CLAY, yellow brown, reddish brown, some gravel.
20.3	20.9	Drill cuttings + hammer action		LIMESTONE, hard, gray.
				Set bottom of temp. surface casing at 20.9 ft
				(casing will be pulled during grouting.)
20.9	22.75			LIMESTONE, hard, gray (N7)
22.75	24.5			LIMESTONE, soft, light olive gray (5Y 5/2)
				(shale?)
24.5	26.0			LIMESTONE, hard, gray (N7)
26.0	27.5			LIMESTONE, medium hard, gray (N7)
27.5	29.0			LIMESTONE, hard, gray (N7)
* 29.0	29.5			LIMESTONE, soft spot, gray to brownish gray
				(5YR 4/1), Water zone
29.5	33.5			LIMESTONE, hard, w/ soft spots, gray.
33.5	35.0			LIMESTONE, medium hard, fractured/broken,
				(chunks of rock comming up - not cut by hammer)
				Olive gray (5Y 4/1) dolomite streaks in gray.
				Limestone.
		35.0	TOTAL DEPTH	

360

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

JH 12/19/97

Boring/Well ~~P-30D~~ MW-30D Project/No. TF0320.013 Page 1 of 2

Site Location Sloss Birmingham Drilling Started 6/19/95 Drilling Completed 6/19/95

Total Depth Drilled 19.5 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device S/S

Length and Diameter of Coring Device 2' x 2" KH 2/6/96 Sampling Interval CONT feet

Land-Surface Elev. 562.26 feet ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used — Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONALD

Prepared By J. HUGHES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	T.P
0	2	1.0	5/12/7/12	~~COKE~~ & CLAY MIXTURE FOR ROAD	NO
				CLAY LT BROWN & DARK YELLOWISH BROWN MOTTLED,	
				STIFF, SATURATED, NO ODOR (CL)	NO
2	4	1.25	5/10/11/13	CLAY, DUSKY YELLOWISH BROWN → MODERATE BROWN	
				(BOTTOM OF SPOON (3")), STIFF, DRY, NO ODOR +	
				SOME ORGANICS (CL).	
4	6	1.0	5/12/10/12	CLAY, LIGHT BROWN, STIFF, DRY, NO ODOR +	NO
				ORGANICS (CL)	
6	8	1.0	6/9/9/14	CLAY SAME AS 4-6, STIFF DRY, NO ODOR	NO
				+ SOME SAND, MED GR, & GRAVEL (CL)	
8	10	1.0	~~4~~5/8/15	CLAY SAME AS 6-8, STIFF, DRY, NO ODOR	NO
				+ SOME GRAVEL (HEAVY MINERAL, CRONKED QTZ, & COAL/COKE)	
				(CL)	
6	12	0.75	2/5/8/16	CLAY SAME AS 8-10, DARK YELLOWISH ORANGE, STIFF, DRY, NO ODOR	1.5
				+ SOME GRAVEL (COKE) + ROCK GRAVEL (CL)	
12	14		16/29/34/39	CLAY, DARK YELLOWISH ORANGE w/ ~~VERY~~ PALE	6.7
				ORANGE MOTTLING, STIFF, ~~DRY~~, NO ODOR	
				+ ORGANICS (ROOTS) (CL)	

361

000139 JH 12/19/97

GM Form 02.6.86 Southpoint 89.1257

GERAGHTY & MILLER, INC. Environmental Services JH 12/19/97

SAMPLE/CORE LOG

Boring/Well ~~P-24D~~ MW-30 D Project/No. TF0320.013 Page 2 of 2

Site Location SCOSS - BIRMINGHAM Drilling Started 6/14/95 Drilling Completed 6/14/95

Total Depth Drilled 19.5 feet Hole Diameter 7 1/4 inches Type of Sample/ Coring Device S/S

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONT feet

Land-Surface Elev. 562.26 feet KB 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used — Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONALD

Prepared By J. HUGHES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	T.D
14	16	2.0	4/7/12/12	CLAY, DARK YELLOWISH ORANGE W/ BLACK & LIGHT BROWN MOTTLING, STIFF, DRY, NO ODOR (CL)	10.5
16	18	1.0	6/9/13/16	CLAY SAME AS 14-16, STIFF, DRY, NO ODOR, W/ SOME ORGANICS (ROOTS) (CL)	7.1
18	20	1.25	3/5/9/50+	CLAY, MOTTLED DARK YELLOWISH ORANGE ~~PALE YELLOWISH ORANGE~~, STIFF, DRY, NO ODOR OVERLYING 3" OF FINE CRYSTALINE LS. IN BOTTOM OF SPOON	5.6
				50 BLOWS FOR 1" ON SECOND SPOON. FINE GRAINED CRYSTALLINE LS W/ COARSE CALCITE CMT FILLING FRACTURES IN BOTTOM OF SPOON.	

362

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

MW-30D JH 12/19/97

Boring/Well ~~P-24D~~ Project/No. SLOSS INDUSTRIES TF0320013 Page 1 of 2

Site Location BIRMINGHAM ALABAMA Drilling Started 6-15-95 1700 Drilling Completed 6-16-95 0815

Total Depth Drilled 59.0 feet Hole Diameter 8¾" 0 to 16' inches Type of Sample/Coring Device NONE

Length and Diameter of Coring Device NONE Sampling Interval NONE feet

Land-Surface Elev. 562.26 feet KT 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used AIR Drilling Method AIR HAMMER

Drilling Contractor GRAVES SERVICE CO. Driller JOHN MITCHELL Helper J.B / DWIGHT

Prepared By J. KIRKPATRKK Hammer Weight NA Hammer Drop NA inches

	Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
	0	16			SEE LITHOLOGY LOG FOR O.B. PREPARED BY
					J. HUGHES (G+M)
	16.0	17.0	AIR HAMMER DRILLING		CLAY, yellowish red brown, (appears mottled)
					soft.
	19.0	19.5			LIMESTONE, broken up, gray color, weathered,
					med. hard.
	19.5	21.7			LIMESTONE, hard, light gray color (N6)
	21.7	22.7			LIMESTONE, hard, fractured, light gray.
*	22.7	26.0			LIMESTONE, gray (N6 or N7), soft w/
					lots of fractures, water bearing zone (muddy)
	~~22~~				producing 1 to 2 gpm.
	26.0	27.0			LIMESTONE, gray (light) N6, hard.
*	28.5	29.3			LIMESTONE, olive gray (5Y 4/1) w/ many
					calcite veins (white N9), softer limestone
					water zone (2-3 gpm)
	29.3	37.0			LIMESTONE, hard to medium hard, some
					calcite veins, ~~dark~~ medium gray (N5) to olive gray
					(5Y 4/1)
	37.0	39.0			LIMESTONE, light gray (N7), hard.
*	39	46.0			LIMESTONE, soft to medium hardness, oli

363

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG (Cont.d)

Boring/Well ~~P-29D~~ MW-30D JH 12/19/97 Page 2 of 2

Prepared By J. KIRKPATRICK

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
		AIR	HAMMER	gray (5Y 4/1), calcite filled veins throughout
				(potential water zone)
46.0	47.0			LIMESTONE, soft, gray
47.0	53.5			LIMESTONE, medium light gray (N6), hard
* 53.5	55.7			LIMESTONE, soft w/ calcite veins, olive
				gray (5Y 4/1), water bearing zone, good
				producer
55.7	57.3			LIMESTONE, Hard, medium light gray and
				olive gray.
* 57.3	59.0			LIMESTONE, soft to medium hard,
				olive gray (5Y 4/1) and gray (N5), possible
				water zone.
		59.0		TOTAL DEPTH

[signature] 6-16-95

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-3/ Project/No. Sloss Industries / TF0320.015 Page 1 of 1

Site Location Birmingham, AL Drilling Started 8/6/97 Drilling Completed 8/6/97

Total Depth Drilled 14 feet Hole Diameter 6 inches Type of Sample/Coring Device SPLIT SPOON

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 569.46 feet ☒ Surveyed ☐ Estimated Datum FT AMSL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Graves Service Company, Inc. Driller RON Helper ALTON/JOHN/DWIGHT

Prepared By Joe Hughes Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	2	2.0	4/8/10/15	FLUE DUST, dry, no odor
2	4	2.0	4/5/4/5	FLUE DUST, wet, no odor
4	6	2.0	4/8/16/50/6	FLUE DUST, wet, no odor
6	8	2.0	4/14/23/32	FLUE DUST, wet, no odor w/ 0.1' OF
				CLAY IN BOTTOM OF SPOON, MOD BROWN (5YR 4/4),
				very stiff, dry
8	10	1.25	14/13/15/8	FLUE DUST, WOOD, ROCK (L.S.), & COAL; CLAY w/ COKE/COAL
				FILL MATERIAL
10	12	0.25	4/8/15/12	CLAY, MOD BROWN (5YR 4/4) w/ SOME LIGHT BROWN
		Fill also		MOTTLING (5YR 5/6), stiff, w/ L.S. (fine
				grained/recrystallized) fragments (float?)
12	14	0.5	4/3/16/15	FILL; CLAY AS ABOVE w/ COKE FRAGMENTS
				& FRAGMENTS (GRAVEL SIZE) OF L.S. PLASTIC, MOIST
14	16	0.1		ROCK (L.S), WOOD, etc
				POSSIBLY THIS IS FILL MATERIAL
16	18	0.1		ROCK (L.S)
				AUGER NOT ABLE TO GO DEEPER THAN 14 FT BLS
				NO SAMPLES COLLECTED FOR ANALYSIS

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-31 Project/No. Sloss Industries / TF0320.015

Site Location Birmingham, AL Drilling Started 8/12/97 Drilling Completed 8/13/97

Total Depth Drilled 19 / 47 feet Hole Diameter 10" / 6" inches Type of Sample/Coring Device NA

Length and Diameter of Coring Device NA Sampling Interval NA feet

Land-Surface Elev. 569.46 feet ☒ Surveyed ☐ Estimated Datum FT AMSL

Drilling Fluid Used Potable H_2O + Air Drilling Method Air Rotary / Hammer

Drilling Contractor Graves Service Company, Inc. Driller John Mitchell Helper Dwight / Alton / Ivan

Prepared By Joe Hughes Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	14			SEE HOLLOW STEM AUGER LOGS
13	15			FILL, METAL, ROCK, ETC
15	17 AIR ROTARY	CUTTINGS		LIMESTONE, FRACTURED & BROKEN
17	19			LIMESTONE, HARD
				CASING SET TO 19 FT BLS
21	22			LIMESTONE, BROKEN, + CLAY (LIGHT OLIVE GRAY 5Y 5/2)
				VERY STIFF, MOIST
22	25.5			CLAY, LIGHT OLIVE GRAY (5Y 5/2), VERY STIFF, MOIST
25.5	26			LIMESTONE, MED GRAY (N7), FRACTURED
26	28.5	AIR HAMMER	CUTTINGS	LIMESTONE, VERY HARD, VERY LITTLE CALCITE, MED GRAY (N7)
28.5	29			LIMESTONE, MED GRAY (N7), MED HARD, FRACTURED, W/SOME
				MOD YELLOWISH BROWN (10YR 5/4) LIMESTONE (POSSIBLY WEATHERED)
29	~~33~~ 35			LIMESTONE, MED GRAY (N7), HARD
				SOFT STOP (W/SHALE OR WEATHERED LIMESTONE) AT 33 TO 33.25
35	38			LIMESTONE, SOFT
38	41			LIMESTONE AS 29 TO 35
41	44.25			LIMESTONE, MED GRAY (N7) MED SOFT
44.25	47			LIMESTONE AS 29 TO 35
				TD 47

366

GERAGHTY & MILLER, INC.
Environmental Services JH 12/19/97

SAMPLE/CORE LOG

Boring/Well ~~P-7~~ (PB) MW-32 Project/No. TF0320.013 Page 1 of 1

Site Location Sloss - Birmingham Drilling Started 6/17/95 Drilling Completed 6/17/95 (19)

Total Depth Drilled 12 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device S/S

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONT feet

Land-Surface Elev. 567.24 feet (EP) 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used ______ Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONNY / HAC

Prepared By J. HUGHES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	T.P
0	2	.5	10/14/4/11	SILTY SAND, BROWNISH BLACK, LOOSE, DRY, NO ODOR, (FINE DUST) ~~(SM)~~ KT 2/6/96	8.1
2	4	1.5	9/6/6/6	SILTY SAND AS ABOVE ~~(SM)~~ KT 2/6/96	9.3
4	6	1.25	5/3/5/2	SILTY SAND AS ABOVE ~~(SM)~~ KT 2/6/96	5.9
6	8	1.25	3/3/1/3	SILTY SAND AS ABOVE ~~(SM)~~ KT 2/6/96	7.3
8	10	1.25	3/25/50	1/2" PENETRATION w/ 50 BLOWS AT 9.0 SILTY SAND AS ABOVE, (SM) SATURATED; w/ LS (FN GR XLS) IN BOTTOM OF S/S	6.4
10	12	0.5	17/10/11/17	LS FRAGMENTS (FN GR XLS) BROKEN (FRACTURED OR WEATHERED) LS. AUGERS WILL NOT GO DEEPER THAN ≈ 9FT. BLS BECAUSE OF AUGER WALL.	

367

~~000094~~ JH 12/19/97

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

P-7 JH 12/19/97

Boring/Well ~~P-7~~ MW-32 Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 4

Site Location BIRMINGHAM ALABAMA Drilling Started 6-19-95 1340 Drilling Completed 6-21-95 1230

Total Depth Drilled 47.5 feet Hole Diameter 9 7/8" 0 to 23.0 6 1/8" 23-47 inches Type of Sample/Coring Device NONE

Length and Diameter of Coring Device NONE Sampling Interval NONE feet

Land-Surface Elev. 567.24 feet ☒ Surveyed ☐ Estimated (KT 2/6/96) Datum MSL

Drilling Fluid Used AIR Drilling Method AIR HAMMER

Drilling Contractor GRAVES SERVICE CO. Driller John Mitchell Helper DWIGHT

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	9	~	~	SEE LITHOLOGY LOG FOR 0.B FOR P-7 (JOE HUGHES) - CLAY + FILL MATERIAL (RUBBLE, SAND + SILT)
8.5	11.5	Roller cone bit for surface casing (cuttings)		LIMESTONE, gray (N7), hard to medium hard, fine grained, competent. No water.
11.5	18.5			SILTY SAND, dark brownish black, loose, moist to saturated, strong creosote odor. Hit water at ~16 ft bls.
18.5	19.5			LIMESTONE, gray (N7), hard to medium hard.
19.5	22.0			CLAY or SILTY SAND, hard to tell, dark brown, saturated.
22.0	42.5			LIMESTONE, gray (N7) & hard. Seem competent. SET SURFACE CASING - BOTTOM AT 23.0 ft bls.
* 42.5	43.0			LIMESTONE, w/ calcite veins, dark gray (N3) hard but some fractures, water bearing zone (producing 1/2 to 1 gpm - estimated)
43.0	47.5			LIMESTONE, gray (N7) to dark gray (N3) hard.

JK 6-21-95

368

000095

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-33 Project/No. Sloss Industries / TF0320.015 Page 1 of 1

Site Location Birmingham, AL Drilling Started 8/8/97 Drilling Completed 8/8/97

Total Depth Drilled 13 feet Hole Diameter 6 inches Type of Sample/Coring Device SPLIT SPOON

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 554.96 feet ☒ Surveyed ☐ Estimated Datum ~~554.96~~ ft a-s-l JH

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Graves Service Company, Inc. Driller RON Helper HAL/CHUCK

Prepared By Joe Hughes Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	OVM
0	2	2.0	4/16/9/9	FLUE DUST + SOME RUBBER	ND
2	4	1.5	6/5/10/12	FLUE DUST, MOIST, NO ODOR	ND
4	6	2.0	10/9/8/5	FLUE DUST, SATURATED, NO ODOR	ND
6	8	2.0	5/8/8/7	FLUE DUST, SATURATED, NO ODOR	ND
8	10	1.0	4/7/11/10	~~FLUE +~~ CLAY, PALE OLIVE (10Y6/2) w/ LIGHT BROWN (5YR5/6) MOTTLING	ND
				STIFF, w/ ROUNDED PEBBLES, DRY, NO ODOR (CL)	
10	12	2.0	4/6/8/9	~~CLAY/ok~~ FLUE DUST + SOME CLAY AS 8-10 MIXED IN	
				UNSURE IF THIS IS A BAD SPOON OR CLAY ABOVE IS	
				FILL.	
12	14	0.5	4/8/50/5	CLAY AS 8-10 W/ ROCK (CL)	
				FLUE DUST ON TOP OF SPOON	
				FLUE DUST MUST BE FLOWING IN SPOON HOLE	
				CLAY MAY BE FROM 1? TO 13	
				WILL COLLECT ANOTHER SAMPLE FROM 11 TO 13	
11	13				

1635

G&M Form 03 6-86 Southprint 87-1718

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-33 Project/No. Sloss Industries / TF0320.015 Page 1 of ____

Site Location Birmingham, AL Drilling Started 8/9/97 Drilling Completed 8/11/97

Total Depth Drilled 26.5/39 feet Hole Diameter 10" / ____ inches Type of Sample/Coring Device NA

Length and Diameter of Coring Device ―― Sampling Interval ―― feet

Land-Surface Elev. 554.46 feet ☒ Surveyed ☐ Estimated Datum ~~554.46~~ FT AMSL

Drilling Fluid Used POTABLE H2O Drilling Method AIR ROTARY/HAMMER

Drilling Contractor Graves Service Company, Inc. Driller John M Helper Ron Acton

Prepared By Joe Hughes Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	14			SEE OVER BURDEN LOG.
14	20	AIR ROTARY	3 FT/2 MIN	LIMESTONE, HARD, FRACTURED, MED GRAY (N5)
				W/ LIGHT BROWN (5YR 5/6), DOLOMITIZED IN
				LIGHT BROWN AREAS
20	23			LIMESTONE, MEDIUM TO SOFT, MED GRAY (N5)
				NO DOLOMITIZED INTERVALS
23	26.5			LIMESTONE, HARD, LIKE 14-20 EXCEPT NOT
				FRACTURED.
				STEEL CASING SET TO ~26.5 FT BGS
26.5	29.5			LIMESTONE, MED GRAY (N7), HARD TO MED HARD,
				DRY
29.5	30			SOFT SPOT H2O BEARING (1-5 GPM)
33				SOFT SPOT, TRACE TO SOME CALCITE FILLED
				VEINS
34.5	38			LIMESTONE, MED GRAY (N7), SHALEY, SOFT
38	39			LIMESTONE, MED GRAY (N7) HARD.

370

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

MW-345 JU 12/19/97

Boring/Well ~~P-6DS~~ Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 1

Site Location BIRMINGHAM ALABAMA Drilling Started 6-19-95 1045 Drilling Completed 6-26-95 0900

Total Depth Drilled 34.5 feet Hole Diameter 9 7/8" 0-16, 6 1/4" 16-34.5 inches Type of Sample/Coring Device NONE

Length and Diameter of Coring Device NONE Sampling Interval NONE feet

Land-Surface Elev. 543.84 feet ☒ Surveyed ☐ Estimated KT 2/6/96 Datum MSL

Drilling Fluid Used AIR Drilling Method AIR HAMMER

Drilling Contractor GRAVES SERVICE CO. Driller John Mitchell Helper Dwight

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

KT 2/6/96

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	12		—	SEE O.B. LITHOLOGY LOG FOR P-6D (JOE
				HUGHES) - CLAY + FILL MATERIAL (GRAVEL +
				RUBBLE).
11.25	13.5	cuttings		LIMESTONE + CLAY, broken weathered L.S intermixed
				w/ O.B. clay.
13.5	14.0			LIMESTONE, hard, gray
14.0	14.5			LIMESTONE, soft gray
14.5	16.0			LIMESTONE, hard, gray, fine grained Set
				Surface casing bottom at 16.0 ft bls.
16.0	27.5 ~~34.5~~			LIMESTONE, gray (N7), fine grained,
				hard, competent, dry.
* 27.5	30.25			LIMESTONE, gray (N7) to dark gray (N4)
				medium hard to soft, broken up rock
				w/ calcite veins (large calcite chunks 1/4")
				Water bearing zone - ~ 3+ gpm)
30.25	34.5			LIMESTONE, hard, gray (N7)(dry?)
		34.5		TOTAL DEPTH

371

G&M Form 03 6 86 ~~000050~~ JU 12/19/96 Southprint 89-1257

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

MW-34D JH 12/19/97

Boring/Well ~~R-6D~~ Project/No. TF0320.013 Page 1 of 1

Site Location SCOSS-BIRMINGHAM, AZ Drilling Started 6/16/95 Drilling Completed 6/16/95

Total Depth Drilled 11.5 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device s/s

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONT feet

Land-Surface Elev. 544.00 feet (KT 2/6/96) ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used — Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONNY / HAL

Prepared By J. HUGHES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description (KT 2/7/96)	TIP
0	2	1.0	4/11/5/5	FILL (0.5') (GW) OVERLYING ~~CLAY~~ → SILTY SAND, BROWNISH BLACK, MOIST, NO ODOR (SM)	ND
2	4	1.5	9/5/10/14	~~CLAY~~ → SILTY SAND, BROWNISH BLACK, SATURATED, NO ODOR + LS FRAGMENTS (FILL), ORGANIC SILT (SM)	ND
4	6	1.75	17/35/24/13	SAME AS ABOVE (FILL MATERIAL vf gr SILTY SAND, W/ORGANIC SILT (SM)	ND
6	8	2.0	11/11/9/8	FILL AS 4-6 (SM) OVERLYING 1FT OF CLAY MODERATE YELLOWISH ORANGE, PLASTIC, SATURATED, NO ODOR ((H)	
8	10	1.0	14/1/1/1	FILL, GRAVEL & BLACK SILTY SAND, DRY, NO ODOR (SM)	
10	12	1.75	6/9/11/50+	4" PENETRATION W/50 BLOWS CLAY, DARK YELLOWISH BROWN W/LIGHT BROWN MOTTLING, STIFF, MOIST, NO ODOR W/ LS FRAGMENTS IN BOTTOM OF SPOON (FNGR XLS) (CL-CH)	

372

~~000091~~ JH 12/19/97

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

MW-34D JU 12/19/67

Boring/Well ~~P-6D~~ Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 2

Site Location BIRMINGHAM ALABAMA Drilling Started 6-19-95 0835 Drilling Completed 6-21-95 1000

Total Depth Drilled 181 feet Hole Diameter 9 7/8" 0 to 16 5 3/4" 16-181 inches Type of Sample/Coring Device NONE

Length and Diameter of Coring Device NONE Sampling Interval NONE feet

Land-Surface Elev. 544.00 feet ☒ Surveyed KD 2/6/96 ☐ Estimated Datum MSL ~~AIR HAMMER~~ JWK 6-21-95

Drilling Fluid Used AIR / WATER Drilling Method AIR HAMMER

Drilling Contractor GRAVES SERVICE CO. Driller John Mitchell Helper Dwight

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	12	~	~	SEE LITHOLOGY LOG FOR P-6S O.B. (JOE
				HUGHES) — CLAY + FILL MATERIAL (RUBBLE)
		Roller	cone bit	
12	16	mud	cuttings	LIMESTONE, highly fractured and broken,
				medium hard to soft, gray (N7). Became
				hard + competent from 15.0' to 16.0'
				SURFACE CASING SET - BOTTOM AT 16.0' blc.
16	19			LIMESTONE, gray (N7), hard, fine grained.
19	35			LIMESTONE, gray (N7) medium hard
35	38			LIMESTONE, gray, hard dry
38	39			LIMESTONE/SHALE zone, soft, gray (N7) +
				dark gray (N3) dry
39	51.5			LIMESTONE, hard, gray (N7). dry
51.5	52			~~LIMESTON~~ SHALE, dark gray (N3), soft.
52	55			LIMESTONE, hard, gray (N7). dry
55	61			LIMESTONE, medium, gray (N7). dry
61	119			LIMESTONE, gray, hard, occasional soft
				spots (~71', 73', 78') and (109')
* 119	119.5			SHALE, dark gray (N3), soft, water bearing
				zone (?)
119.5	152			LIMESTONE hard, gray (N7)

373

000092 JU 12/19/67

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG (Cont.d)

Boring/Well ~~P-6D~~ MW-34D JH 12/19/97

Prepared By J. KIRKPATRICK

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
152	152.5	Rock chips + hammer noise		LIMESTONE, softer spot, dark gray
152.5	160			LIMESTONE, hard, gray (N7)
160	160.5			LIMESTONE, soft, gray
160.5	168.			LIMESTONE, gray, hard
* 168	170			LIMESTONE, medium hard to soft, calcite
				veins (possible water bearing zone - 1/5th gpm)
170	~~184~~			LIMESTONE, hard, gray (N7)
		181	TOTAL DEPTH	

Jason Kirkpatrick
6-21-95

G&M Form 04 6 86

Southprint 87 1719

000093 JH 12/19/97

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-35 Project/No. Sloss Industries / TF0320.015 Page 1 of 1

Site Location Birmingham, AL Drilling Started 8/ 8 /97 Drilling Completed 8/ 8 /97

Total Depth Drilled 11.5 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT ~~SPOON~~

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet

Land-Surface Elev. ~~11.5~~ 542.46 JH 12/19/97 feet ☒ Surveyed ☐ Estimated Datum ~~542.46~~ FT AMSL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Graves Service Company, Inc. Driller RON Helper HAL/CHUCK

Prepared By Joe Hughes Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	OVM
0	2	1.5	19/22/29/29	FLUE DUST	ND
2	4	0.5	28/50/.5	FLUE DUST	ND
4	8	CUTTINGS		RUBBLE & FLUE DUST SLIGHT CHEMICAL ODOR (NO OVM HITS)	ND
8	10	1.5	2/5/7/12	CLAY, GRAYISH ORANGE (10YR 7/6) - SLIGHT BROWN MOTTLED (5YR 5/6)	ND
				STIFF, SLIGHTLY MOIST, NO ODOR (CL)	
10	12	1.5	10/12/14/50	BROKEN ROCK AT 11.5	ND
				CLAY AS 8-10 (CL)	

375

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-35 Project/No. Sloss Industries / TF0320.015 Page 1 of 2

Site Location Birmingham, AL Drilling Started 8/ 11 /97 Drilling Completed 8/13 /97

Total Depth Drilled 17/42 feet Hole Diameter 6"/6" inches Type of Sample/ Coring Device NA

Length and Diameter of Coring Device NA Sampling Interval NA feet

Land-Surface Elev. 542.46 ~~4.5~~ (JH) feet ☒ Surveyed ☐ Estimated Datum ~~542.46~~ JH FT AMSL

Drilling Fluid Used POTABLE H_2O + AIR Drilling Method AIR ROTARY / HAMMER

Drilling Contractor Graves Service Company, Inc. Driller JOHN Helper DWIGHT / ALTON / RON

Prepared By Joe Hughes Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	11.5			SEE HOLLOW STEM AUGER LOG
11.5	15.5	ROTARY AIR	CUTTINGS	LIMESTONE, MED GRAY (N7), BROKEN & FRACTURED
15.5	17			HARD LIMESTONE, MED GRAY (N7), FINE GR
				RECRYSTALIZED
				CASING SET TO 17 FT BLS
17	19	AIR HAMMER		LIMESTONE, MED GRAY (N7), FN GR, HARD
19	20			LIMESTONE, MED GRAY (N7), FN GR, MEDIUM TO SOFT HARDNESS
20	23			LIMESTONE AS 17-19 w/ TRACE CALCITE FILLED VEINS
23	27			VERY HARD LIMESTONE, MED GRAY (N7), w/ THIN BEDDED
				LIMESTONE, NO CALCITE
27	29			AS 19-20
29	32.75			LIMESTONE, MED GRAY (N7), FN GR, VERY HARD
32.75	33			SOFT SPOT/FRACTURED LIMESTONE W/ SMALL PIECE OF CALCITE
				FILLED VEIN
33	36			AS 23-27
36	37			LIMESTONE, MED GRAY (N7) VERY HARD w/ SOME CALCITE FILLED VEINS
				& SOME DRY BROWN CLAY/SHALE
37	39			AS 29-32.75

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-35 Page 2 of 2

Prepared By Joe Hughes

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
39	41	Air		Limestone, med gray (N7), very hard, w/
		Hammer		some calcite filled veins (39.25 - crack)
				Recrystallized, F-Gr
41	42			As 29 - 32.75
				TD 42 FT

G&M Form 04 4-89 Southprint 89-0910

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-5~~ MW-36 (JH 2/14/97) Project/No. TF0320.013 Page 1 of 1

Site Location SLOSS - BIRMINGHAM, ALA Drilling Started 6/16/95 Drilling Completed 6/16/95

Total Depth Drilled 12.5 feet Hole Diameter 7 1/4 inches Type of Sample/Coring Device S/S

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONT feet

Land-Surface Elev. 530.34 feet ☒ Surveyed (KT 2/6/96) ☐ Estimated Datum MSL

Drilling Fluid Used — Drilling Method HSA

Drilling Contractor GRAVES Driller RON Helper DONNY / HAL

Prepared By J. HUGHEY Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	TIP
0	2	1.5	1/1/1/1	CLAY, MODERATE BROWN → GRAY BROWN PLASTIC, SATURATED, NO ODOR, COLOR CHANGE AT ± 1 FT BLS (M BROWN → G BROWN) (CH)	ND ND
2	4	1.5	2/2/4/5	CLAY, LIGHT BROWN, STIFF, MOIST, NO ODOR (CL-CH)	
4	6	1.5	4/7/8/10	CLAY, DARK YELLOWISH ORANGE, STIFF, MOIST NO ODOR, W/SOME BLACK (ORGANIC SILT) (CL)	ND
6	8	1.5	8/12/11/14	CLAY, DARK YELLOWISH ORANGE, STIFF, SATURATED AT 7 FT BLS DRY → MOIST ?7 FT BLS, NO ODOR, W/ IRON CONCRETIONS, GRAVEL (ANGULAR) AND BLACK ORGANIC SILT (CL)	ND
8	10	1.75	6/7/11/12	CLAY, MOTTLED, DARK YELLOWISH ORANGE, GRAYISH ORANGE & VERY PALE ORANGE, STIFF, DRY, NO ODOR W/ BLACK ORGANIC MATTER (ROOTS) & SILT (CL)	ND
10	12	1	2/1/7/8	CLAY, SAME AS ABOVE STIFF, DRY, NO ODOR W/ BLACK (ORGANIC SILT), & MODERATE RED MOTTLING (CL; BOTTOM OF SPOON IS WET	ND
12.5	14.5		50	1/2 INCH OF PENETRATION W/ 50 BLOWS, LS FRAGMENTS	

378

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ~~P-5~~ MW-36 JH 12/15/97 Project/No. TF0320013 SLOSS INDUSTRIES Page 1 of 1

Site Location BIRMINGHAM ALABAMA Drilling Started 6-20-95 Drilling Completed 6-23-95 1130

Total Depth Drilled 137 feet Hole Diameter 9 7/8" 0-15.5 6 1/8 ~~15.5-137~~ inches Type of Sample/Coring Device NONE

Length and Diameter of Coring Device NONE Sampling Interval NONE feet

Land-Surface Elev. 530.34 feet (KF) 2/6/96 ☒ Surveyed ☐ Estimated Datum MSL

Drilling Fluid Used AIR Drilling Method AIR HAMMER

Drilling Contractor GRAVES SERVICE CO. Driller JOHN MITCHELL Helper J.B/DWIGHT

Prepared By J. KIRKPATRICK Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	12.5			SEE O.B. LOG FOR P-5 (JOE HUGHES)
				CLAY, brown to yellowish brown, stiff
12.5	14.5			LIMESTONE, gray (N7 to N6) medium hard
				broken + fractured.
14.5	49.0			LIMESTONE, gray, hard, competent, fine grained
				SURFACE CASING SET - BOTTOM AT 15.5' b/s.
49.0	50.5			LIMESTONE, olive gray (5Y 4/1), soft
50.5	60.0			LIMESTONE, gray, hard.
60.0	61.0			LIMESTONE, gray, soft to medium hard.
61	110			LIMESTONE, light gray, hard.
110	110.5			L.S., soft
110	132			LIMESTONE, gray (N7), hard + medium
				hard.
* 132	132.5			LIMESTONE, medium gray w/ calcite veins,
				soft. (water zone ~ 2-3 gpm)
132.5	137			LIMESTONE, gray, hard.

6-23-95

379

G&M Form 03 6-86 ~~000689~~ JH 12/15/97 Southprint 89-1257

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-37 Project/No. Sloss Industries / TF0320.015 Page 1 of 1

Site Location Birmingham, AL Drilling Started 8/ 8 /97 Drilling Completed 8/ 8 /97

Total Depth Drilled 10 feet Hole Diameter 6 inches Type of Sample/Coring Device SPLIT SPOON

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 535.3 feet ☒ Surveyed ☐ Estimated Datum FT AMSL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor Graves Service Company, Inc. Driller RON Helper CHUCK

Prepared By Joe Hughes Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	OVM
0	2	1.5	4/5/4/2	COKE OVERLYING 0.25' CLAY, LIGHT BROWN, 5YR5/6 STIFF DRY (CL)	ND
2	4	1.5	2/3/3/4	CLAY AS 0-2, moist plastic (CH)	ND
4	6		4/5/6/8	CLAY light brown 5YR5/6 w/ pale olive 10Y6/2 mottling, stiff, moist, no odor (CL)	ND
6	8	1.0	7/10/10/12	CLAY AS ABOVE + CLAY very stiff, grayish orange 10YR7/4 w/ pale olive 10Y6/2 mottling, moist, no odor, bedded look? (CL)	ND
8	10	1.75	4/8/11/11	CLAY grayish orange 10YR7/4 w/ pale olive 10Y6/2 & light brown 5YR5/6 mottling, stiff, no odor, moist (CL)	ND
10	12	0.25	50/3	AUGER REFUSAL AT 10 ROCK AT 10'	

not stored

10-10 t

380

GERAGHTY & MILLER, INC.
Ground-Water Consultants

SAMPLE/CORE LOG

Boring/Well MW-37 Project/No. Sloss Industries / TF0320.015 Page 1 of 1

Site Location Birmingham, AL Drilling Started 8/7/97 Drilling Completed 8/11/97

Total Depth Drilled 30 feet Hole Diameter 10" / inches Type of Sample/Coring Device NA

Length and Diameter of Coring Device NA Sampling Interval — feet

Land-Surface Elev. 535.36 feet ☒ Surveyed ☐ Estimated Datum FT AMSL

Drilling Fluid Used POTABLE H_2O + AIR Drilling Method AIR ROTARY

Drilling Contractor Graves Service Company, Inc. Driller JOHNS Helper RON / ALTON

Prepared By Joe Hughes Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	10		AIR ROTARY	SEE HOLLOW STEM AUGER LOGS
10.5	11.5	CUTTINGS		LIMESTONE, MED GRAY (N7), FRACTURED
11.5	12.75			LIMESTONE, MED GRAY (N7), HARD
12.75	13.75			LIMESTONE, MED GRAY, HARD, FRACTURED
13.75	15.0			LIMESTONE, HARD, MED GRAY (N7), MINOR TO
				TRACE CALCITE FILLED VEINS
				STEEL CASING SET TO 15 FTBLS
15	18.25			LIMESTONE (MED GRAY N7), HARD, DRY
18.25				FRACTURED LIMESTONE, (MED GRAY (N7))
				W/ CALCITE FILLED VEINS. MAKES GOOD H_2O (15-20 GPM)
19.25				LIMESTONE, SOFT (FRACTURE), LESS CALCITE THAN
				18.25
21	23.5			LIMESTONE, MED GRAY (N7), MEDIUM HARD
23.5	30			LIMESTONE, MED GRAY (N7), HARD
				SOFT SPOT AT 25 & 29.

G&M Form 03 6-86 Southprint 87-1718

VOLUME I

APPENDIX A.5

WELL CONSTRUCTION LOGS

GROUNDWATER PIEZOMETER REPORT

Client Sloss Industries Site Location Birmingham, Alabama
Well Location NE ACCESS ROAD TO SAND MOUNTAIN
Project No. TF0320.015
Co tor Graves Service Company Inc. Driller(s) John Mitchell
Dri..g Method(s) Hollow Stem Auger/Air Rotary Helper(s) Dwight/Alton/Ron
Prepared By Joe Hughes Date(s) Installed 8/6/97 to 8/7/97

Well/~~Piezometer~~ No. MW-21
SWMU Area LD
SWMU 23

Survey Datum TOC 558.85 AMSL

Ground Elevation

GENERAL SOIL CONDITIONS (Not to Scale)

0
CLAY STIFF TO PLASTIC, DRY-DAMP (CL-CH)
8 LINE
9'
CLAY, STIFF, LIGHT BROWN (CL)
23
LIMESTONE, FRACT, HARD
28.5
LIMESTONE MED HARD, FRACT W/CALCITE FILLED VEINS
29.5
CLAY W/LIMESTONE
30.25
LIMESTONE
32
LIMESTONE, HARD FRACT 31.75 TO 32
33.75
LIMESTONE MED W/CLAY
34.75
LIMESTONE, FRACT, HARD
36.75
LIMESTONE, MED HARD
37.75
LIMESTONE, FRACT, HARD
42

Item	Value
Type of Protective Cover	STEEL
ID of Surface Casing	NA
Type of Surface Casing	NONE
Diameter of Borehole	10"
Depth Bottom of Surface Casing	NA
Type of Riser Pipe	2" PVC SCH 40
Diameter of Borehole	10"
Type of Grout Around Riser Pipe	TYPE I-II (12+8 BAGS)
Depth Top of Seal	24
Type of Seal	BENTONITE PELLETS (2 BUCKETS)
Depth Bottom of Seal	27
Depth Top of Screen	29
Screen Section Material	2" PVC SCH 40
Screen Size	0.010 SLOT
Type of Sand Pack Around Screen	20/30 SAND (16 BAGS)
Depth Bottom of Screen	39
Depth Bottom of Borehole/Sandpack	41 SAND 42 FILL

REMARKS:
NO PLACE TO SET SURFACE CASING

GERAGHTY & MILLER, INC.
Environmental Services

g:\proj\tf320\tbl\obswell2.xl5

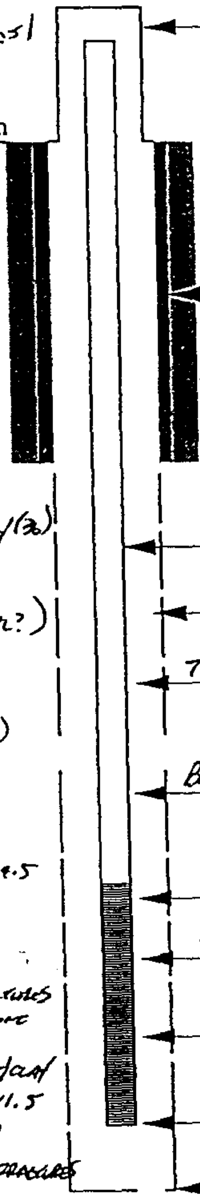
GROUNDWATER PIEZOMETER REPORT

Client Sloss Industries
Location Birmingham, Alabama
Project No. TF0320.013
Contractor GRAVES
Driller(s) JOHN M
Drilling Method(s) AIR ROTARY
Helper(s) JB/DWIGHT P.
Prepared By J. HUGHES
Date(s) Installed 7/19/95 - 7/20/95

MW-22
Boring No. P-31
JU 2/19/97

Survey Datum 628.86 ft amsl

KD 2/6/96
Ground Elevation 625.70 ft amsl



GENERAL SOIL CONDITIONS (Not to Scale)

0 SANDSTONE
8.5 CLAY
9 SANDSTONE
13.5 CLAY
S.S STRINGERS 22.75-28.5
28.5 SHALE/CLAY
S.S STRINGER 34.75-35
LIGHT BROWN → GRAY (30)
72 BLACK SILT (COAL?)
72.5 SHALE/CLAY GRAY BROWN (76-83)
83 SANDSTONE TO SILTSTONE
MINOR L.S. 102-104.5
104.5 LIMESTONE, w/ CALCITE FILLED FRACTURES MINOR S.S & SILTSTONE
109.5 CLAY → SHALE/CLAY S.S STRINGER 111.5
114.5 LIMESTONE W/ CALCITE FILLED FRACTURES & FOSSILS
119

Type of Protective Cover	4" STEEL
ID of Surface Casing / Type of Surface Casing	N/A
Diameter of Borehole	6 1/8"
Depth Bottom of Surface Casing	N/A
Type of Riser Pipe	2" PVC
Diameter of Borehole	6 1/8"
Type of Grout Around Riser Pipe	TYPE I-II PORTLAND CEMENT
Depth Top of Seal	103.5
Type of Seal	BAROID 3/8" BENTONITE PELLETS
Depth Bottom of Seal	106
Depth Top of Screen	108.5
Type of Screen Section	2" PVC
Type of Sand Pack Around Screen	PERMIA 20/30
Depth Bottom of Screen	118.5
Depth Bottom of Borehole/Sandpack	119

REMARKS:
± 150 GALLONS ADDED TO BOREHOLE TO CLEAN CUTTINGS OUT OF BOREHOLE.

GERAGHTY & MILLER, INC.
Environmental Services

g:\proj\tf320\tbl\obswell2.xls

GROUNDWATER PIEZOMETER REPORT

Client: Sloss Industries
Location: Birmingham, Alabama
Project No.: TF0320.013
Contractor: GRAVES SERVICE CO.
Drilling Method(s): AIR ~~HAMMER~~/ROTARY
Prepared By: J. KIRKPATRICK
Driller(s): DWIGHT PRUIT ~~JOHN MITCHELL~~ JK 7-27-95
Helper(s): J. BUTLER
Date(s) Installed: JULY 27 1995

Boring No. MW-23 ~~P-30~~ JE 12/19/97

Survey Datum 635.88 ft amsl
KT 2/6/96
Ground Elevation 632.94 ft amsl

Depth / Soil	Item	Value
	Type of Protective Cover	4" STEEL
CLAY, reddish brown, dry	ID of Surface Casing / Type of Surface Casing	NONE
	Diameter of Borehole	NA
— 38.0 —	Depth Bottom of Surface Casing	NONE
CLAY or WEATHERED SHALE, gray, dry	Type of Riser Pipe	SCH 40 PVC
— 53.0 — SHALE, lite brown, dry	Diameter of Borehole	6"
— 55.0 — SANDSTONE, brown	Type of Grout Around Riser Pipe	PORTLAND TYPE I
— 57.0 —	Depth Top of Seal	64.7
SHALE, gray, weathered w/ lenses (<1 ft) of gray Sandstone throughout this interval.	Type of Seal	Bentonite Pellets
	Depth Bottom of Seal	67.0
	Depth Top of Screen	68.5
	Type of Screen Section	SCH 40 PVC (#10 SLOT) 0.010"
	Type of Sand Pack Around Screen	20/30 Silica Sand
Hard spot at ~76 seems to be making water.	Depth Bottom of Screen	78.5
	Depth Bottom of Borehole/Sandpack	79.0

GENERAL SOIL CONDITIONS (Not to Scale)

REMARKS:

Used 50 gallons of potable water to clean out borehole.

GERAGHTY & MILLER, INC. Environmental Services

386

g:\proj\tf320\tbl\obswell2.xls

000205 JE 12/19/97

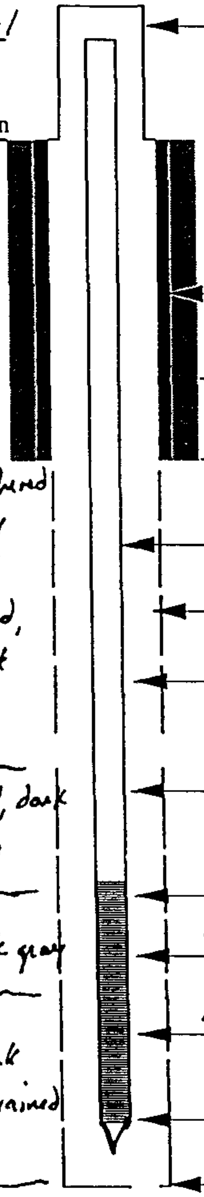
GROUNDWATER PIEZOMETER REPORT

Client	Sloss Industries
Location	Birmingham, Alabama
Project No.	TF0320.013
Contractor	GRAVES SERVICE CO.
Drilling Method(s)	AIR ROTARY / HAMMER
Prepared By	J. KIRKPATRICK
Driller(s)	DWIGHT PRUITT
Helper(s)	JOHN BUTLER
Date(s) Installed	JULY 26 1995
Boring No.	MW-24 ~~P-29~~ JH 12/19/97

Survey Datum 594.99 ft amsl

JH 2/6/96

591.81 ft amsl Ground Elevation



GENERAL SOIL CONDITIONS (Not to Scale)

CLAY, reddish brown, stiff

— 21.0 —

SHALE, highly weathered (like clay) gray

— 29.0 —

SHALE, weathered, gray, still not very hard.

— 54.5 —

SHALE, weathered, dark gray, becoming harder

— 66.75 —

SHALE, hard, dark gray

— 69.0 —

SANDSTONE, dark gray, medium grained very hard.

— 76.0 —

Type of Protective Cover	4" STEEL
ID of Surface Casing / Type of Surface Casing	NONE
Diameter of Borehole	NA
Depth Bottom of Surface Casing	NONE
Type of Riser Pipe	SCH 40 PVC
Diameter of Borehole	6"
Type of Grout Around Riser Pipe	PORTLAND TYPE I
Depth Top of Seal	59.0
Type of Seal	Bentonite Pellets
Depth Bottom of Seal	61.1
Depth Top of Screen	63.3
Type of Screen Section	SCH 40 PVC (0.010" SLOT) #10
Type of Sand Pack Around Screen	20/30 Silica Sand
Depth Bottom of Screen	~~73.0~~ 73.3 JWK 7-26-95
Depth Bottom of Borehole/Sandpack	76.0

REMARKS:

Had ~2 ft of fall-in on the bottom of borehole, accumulated between pulling the rods + installing the well. Should have no effect on well.

GERAGHTY & MILLER, INC.
Environmental Services

~~000201~~ JH 12/19/97

387

g:\proj\tf320\tbl\obswell2.xls

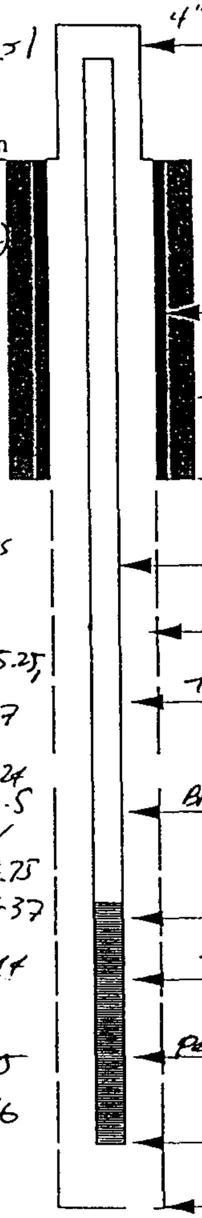
GROUNDWATER PIEZOMETER REPORT

Client Sloss Industries
Location Birmingham, Alabama
P[illegible] [illegible]t No. TF0320.013
C[illegible] actor GRANCY
Drilling Method(s) AIR ROTARY
Prepared By J. HUGHES

Driller(s) JOHN M.
Helper(s) JB / DWIGHT
Date(s) Installed 7/14 → 18/95

Boring No. MW-25S ~~P-25D~~
S
JH 12/15/97 KT 2-25-98

Survey Datum 559.67 ft amsl
KT 2/6/96
556.76 ft amsl Ground Elevation



GENERAL SOIL CONDITIONS (N[illegible] Scale)

0 SILT + SAND (FILL MATERIAL)
18 CLAY w/ L.S. RUBBLE
28 L.S.
HARD, SOFT, & BROKEN IN SPOTS
HARD 24-25, 34.75-35.25
SOFT 35.25-37
BROKEN 22.75-24, 25-26.5, 27-31, 31-34.75, 35.25-37
HARD & SOFT 37-44
BROKEN 44-45.75
HARD 45.75-46

Type of Protective Cover	4" STEEL	
ID of Surface Casing	6"	
Type of Surface Casing	STEEL	
Diameter of Borehole	10	
Depth Bottom of Surface Casing	32	
Type of Riser Pipe	2" PVC	
Diameter of Borehole	6"	
Type of Grout Around Riser Pipe	TYPE I-II	
Depth Top of Seal	31	
Type of Seal	BAROID 3/8" BENTONITE PELLETS	
Depth Bottom of Seal	33.5	
Depth Top of Screen	35.5	
Type of Screen Section	2" PVC 0.010 SLOT	
Type of Sand Pack Around Screen	PERMA 20/30 SAND	
Depth Bottom of Screen	45.5	
Depth Bottom of Borehole/Sandpack	46	

REMARKS:

50 GAL H_2O ADDED TO CLEAN BOREHOLE

GERAGHTY & MILLER, INC.
Environmental Services

g:\proj\tf320\tbl\obswell2.xls

GROUNDWATER PIEZOMETER REPORT

Client	Sloss Industries
Location	Birmingham, Alabama
Project No.	TF0320.013
Contractor	GRAVES SERVICE CO.
Driller(s)	DWIGHT PRUITT
Drilling Method(s)	AIR ROTARY
Helper(s)	JOHN BUTLER
Prepared By	J. KIRKPATRICK
Date(s) Installed	JULY 26, 1995

Boring No. MW-25D ~~P-28D~~ JH 12/19/97

Survey Datum 559.63 ft amsl

KT 2/6/96

556.89 ft amsl Ground Elevation

GENERAL SOIL CONDITIONS (Not to Scale)

CLAY and LIME FILL
— 23.0 —
L.S. broken, weathered
— 29.0 —
L.S. hard, gray
— 31.0 —
L.S. broken, gray some calcite
— 37.0 —
CLAY or SHALE, weathered
— 39.0 —
L.S. broken, weathered gray.
— 44.0 —
L.S and Shale (or clay) in lenses (1-2 ft thick), all med. gray color, all weathered.
— 63.0 —
L.S., hard, gray
— 64.0 —
L.S. broken, weathered gray, w/ calcite.
— 67.0 —

Type of Protective Cover	4" STEEL
ID of Surface Casing / Type of Surface Casing	6+" STEEL
Diameter of Borehole	9 7/8" (10")
Depth Bottom of Surface Casing	31.0
Type of Riser Pipe	SCH 40 PVC
Diameter of Borehole	6"
Type of Grout Around Riser Pipe	PORTLANT TYPE 1
Depth Top of Seal	51.9
Type of Seal	Bentonite Pellets
Depth Bottom of Seal	54.1
Depth Top of Screen	56.3
Type of Screen Section	SHC 40 PVC (0.010" SLOT) #10
Type of Sand Pack Around Screen	20/30 Silica Sand
Depth Bottom of Screen	66.3
Depth Bottom of Borehole/Sandpack	67.0

REMARKS:

Washed out borehole w/ 50 gallons of water.

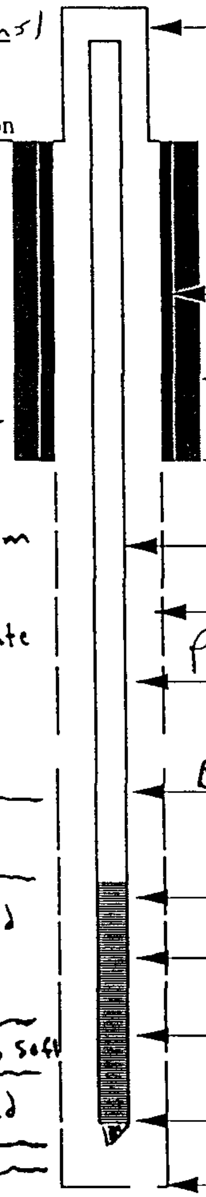
GERAGHTY & MILLER, INC. *Environmental Services*

GROUNDWATER PIEZOMETER REPORT

Client: Sloss Industries
Location: Birmingham, Alabama
Project No.: TF0320.013
Contractor: GRAVES SERVICE CO.
Driller(s): JOHN MITCHELL
Drilling Method(s): AIR HAMMER
Helper(s): J.B / DWIGHT
Prepared By: J. KIRKPATRACK
Date(s) Installed: JUNE 20 1995

Boring No. MW-26 ~~P-27~~ JH 12/19/97

Survey Datum 549.58 ft amsl
KT 2/6/96
Ground Elevation 547.41 ft amsl



GENERAL SOIL CONDITIONS (... Scale)

CLAY,

~ 22.0 ~

LIMESTONE, fine grained, medium gray (N6), occasional calcite veins

~ 83.0 ~

L.S./SHALE, soft

~ 91.0 ~

L.S., gray, hard

~ 100.0 ~

SHALE, gray brown, soft

~ 105.0 ~

L.S., gray, hard

~ 135 ~

SHALE

~ 136 ~

L.S.

Item	Value
Type of Protective Cover	4" STEEL
ID of Surface Casing / Type of Surface Casing	6" Steel
Diameter of Borehole	8 3/4"
Depth Bottom of Surface Casing	24'
Type of Riser Pipe	SCH 40 PVC
Diameter of Borehole	5 3/4"
Type of Grout Around Riser Pipe	Portland Type I KT
Depth Top of Seal	124.3
Type of Seal	Bentonite Pellets
Depth Bottom of Seal	126.9
Depth Top of Screen	130.5
Type of Screen Section	SCH 40 PVC (0.010") #10 SLOT
Type of Sand Pack Around Screen	20/30 Silica
Depth Bottom of Screen	140.5
Depth Bottom of Borehole/Sandpack	141.0

REMARKS:

GERAGHTY & MILLER, INC. Environmental Services

g:\proj\tf320\tbl\obswell2.xls

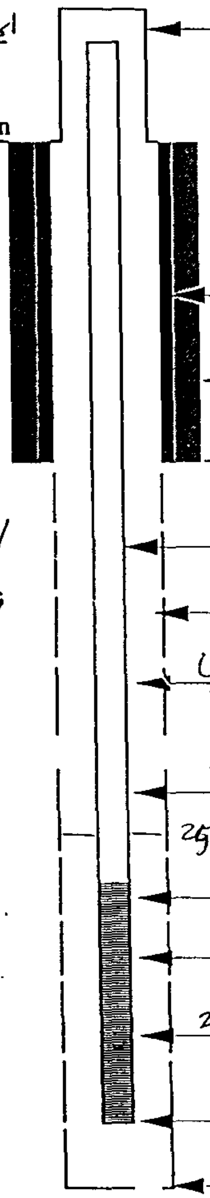
~~000201~~ JH 12/19/97

GROUNDWATER PIEZOMETER REPORT

Client: Sloss Industries
Location: Birmingham, Alabama
Project No.: TF0320.013
Contractor: GRAVES SERVICE CO.
Driller(s): John Mitchel
Drilling Method(s): Air Hammer
Helper(s): JB & DWIGHT
Prepared By: J. KIRKPATRICK
Date(s) Installed: 6-13-95 DRILLED

Boring No. MW-27 ~~P-26~~ SH 12/19/97

Survey Datum: 554.97 SH 12/19/97 ~~554.09~~ ft amsl
KT 2/6/96
552.02 ft amsl Ground Elevation



Value	Item
4" STEEL	Type of Protective Cover
6" Steel	ID of Surface Casing / Type of Surface Casing
9 7/8"	Diameter of Borehole
25.5	Depth Bottom of Surface Casing
2" PVC	Type of Riser Pipe
5 3/4"	Diameter of Borehole
LEHIGH PORTLAND CEMENT TYPE I-II	Type of Grout Around Riser Pipe
23.1	Depth Top of Seal
BENTONITE PELLETS (3/8")	Type of Seal
25.55	Depth Bottom of Seal
27.0	Depth Top of Screen
0.010 2" PVC	Type of Screen Section
20/30 PEARL SAND 50LB BAG	Type of Sand Pack Around Screen
37.0	Depth Bottom of Screen
37.0	Depth Bottom of Borehole/Sandpack

GENERAL SOIL CONDITIONS (No Scale)

CLAY, red orange, w/ gravel.

23.0

Limestone gray, hard w/ calcite seams

37.0

REMARKS:
4-50 LB BAGS OF 20/30 SAND USED
1/3-5 GAL BUCKET OF 3/8" BENTONITE PELLETS
6-94 BAGS OF TYPE I-II CEMENT

GERAGHTY & MILLER, INC.
Environmental Services

g:\proj\tf320\tbl\o391f2.xls

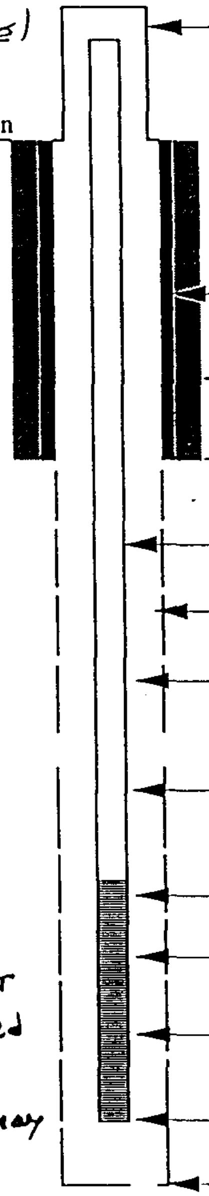
~~000200~~ SH 12/19/97

GROUNDWATER PIEZOMETER REPORT

Client: Sloss Industries
Location: Birmingham, Alabama
Project No.: TF0320.013
Contractor: GRAVES SERVICES CO.
Driller(s): John Mitchell
Drilling Method(s): AIR HAMMER
Helper(s): J.B / DWIGHT
Prepared By: J. KIRKPATRICK
Date(s) Installed: JUNE 15, 1995

Boring No. MW-28 ~~P-25~~ JH 12/19/97

Survey Datum 558.32 ft cmsl
KT 2/6/96
556.44 ft cmsl Ground Elevation



GENERAL SOIL CONDITIONS (Not to Scale)

CLAY Reddish brown

18'

LIMESTONE, gray, hard,

(52-53) LIMESTONE, soft w/ calcite filled veins.

53' LIMESTONE, gray hard

Type of Protective Cover	4" STEEL
ID of Surface Casing / Type of Surface Casing	NONE
Diameter of Borehole	9"
Depth Bottom of Surface Casing	NONE
Type of Riser Pipe	SCH 40 PVC
Diameter of Borehole	6¼"
Type of Grout Around Riser Pipe	PORTLAND TYPE I
Depth Top of Seal	43.0
Type of Seal	Bentonite pellets
Depth Bottom of Seal	46.0
Depth Top of Screen	48.0
Type of Screen Section	SCH 40 PVC 0.010" SLOT
Type of Sand Pack Around Screen	20/30 SILICA SAND
Depth Bottom of Screen	58.0
Depth Bottom of Borehole/Sandpack	58.0

REMARKS:

GERAGHTY & MILLER, INC. Environmental Services

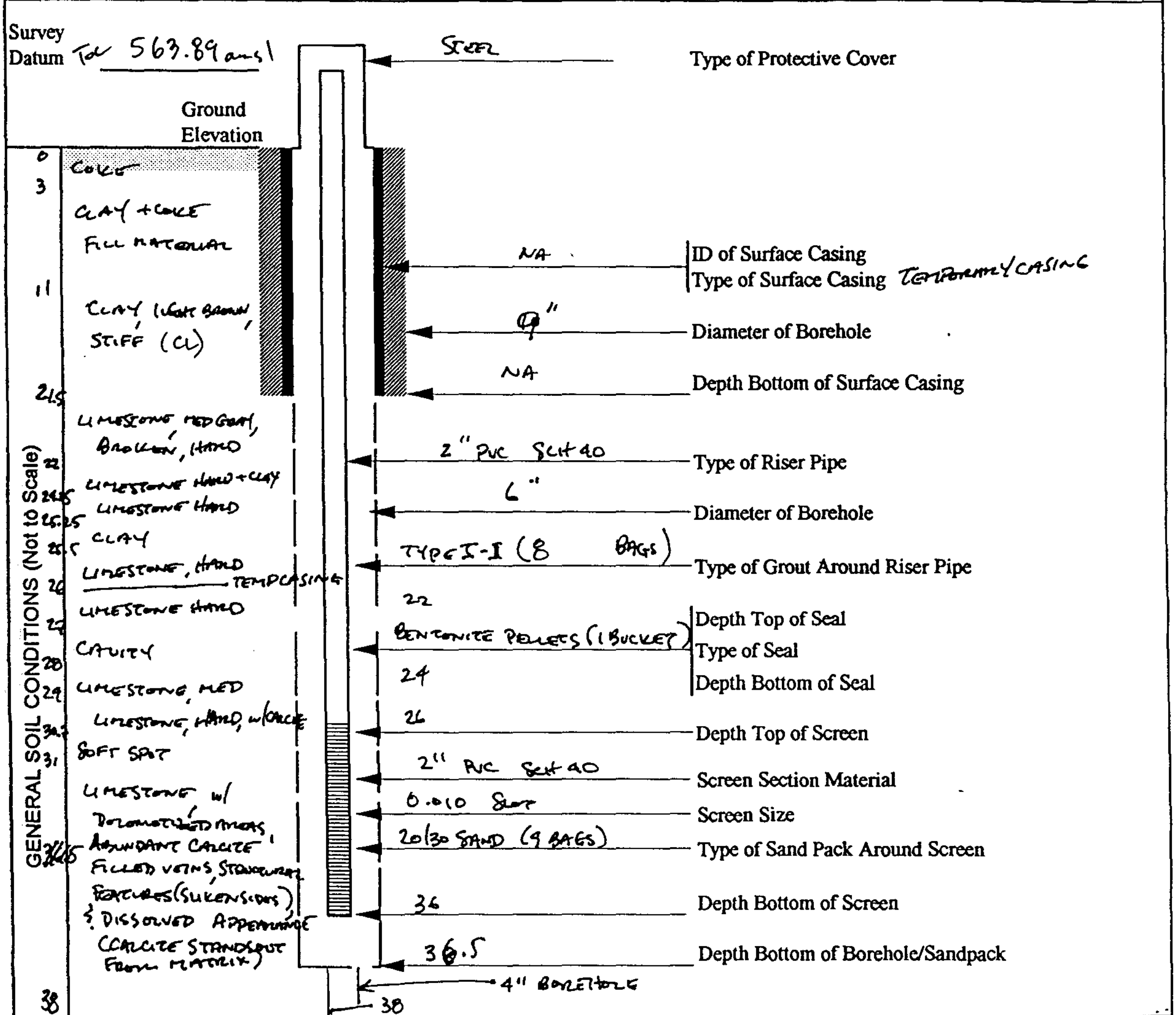
392

g:\proj\tf320\tbl\obswell2.xls

~~000199~~ JH 12/19/97

GROUNDWATER PIEZOMETER REPORT

Client: Sloss Industries
Site Location: Birmingham, Alabama
Well Location: 1/2 way between MW-30S&D & MW28 ± 30 FT W of fence
Project No.: TF0320.015
Well/Piezometer No.: MW-29
Contractor: Graves Service Company Inc.
Driller(s): John Mitchell
Drilling Method(s): Hollow Stem Auger/Air Rotary
Helper(s): Ron / Alton / Dwight
SWMU Area: LD
Prepared By: Joe Hughes
Date(s) Installed: 8/7/97 to 8/12/97
SWMU: 38



REMARKS:

MAKES 10-12 GPM (EST.)

GERAGHTY & MILLER, INC. Environmental Services

g:\proj\tf320\tbl\obswell2.xls

GROUNDWATER PIEZOMETER REPORT

Client	Sloss Industries
Location	Birmingham, Alabama
Project No.	TF0320.013
Contractor	GRAVES SERVICE CO.
Driller(s)	J. Mitchell
Drilling Method(s)	AIR HAMMER
Helper(s)	J.B / DWIGHT
Prepared By	J. KIRKPATRICK
Date(s) Installed	6-20-95

Boring No. MW-30S ~~P-24S~~ JH 12/19/97

Survey Datum 564.68 ft msl KT 2/6/96

562.21 ~~564.68~~ ft msl Ground Elevation

GENERAL SOIL CONDITIONS (Not to Scale)

CLAY, yellow, reddish brown,

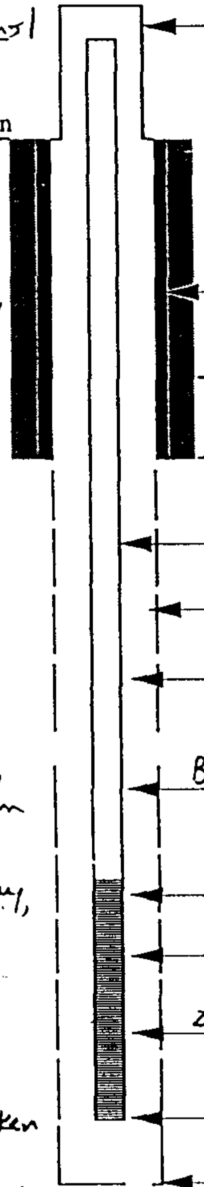
20.3

LIMESTONE gray, hard

22.75 - 24.5 L.S. soft, olive brown

LIMESTONE gray, hard

33.5 - 35.0 L.S. broken gray w/ dolomite streaks.



4" STEEL	Type of Protective Cover
NONE	ID of Surface Casing / Type of Surface Casing
8 3/4"	Diameter of Borehole
NONE	Depth Bottom of Surface Casing
SCH 40 PVC	Type of Riser Pipe
5 3/4"	Diameter of Borehole
Portland Type I KT	Type of Grout Around Riser Pipe
20.9	Depth Top of Seal
Bentonite pellets	Type of Seal
22.8	Depth Bottom of Seal
24.5	Depth Top of Screen
SCH 40 PVC 0.010" SLOT (#10)	Type of Screen Section
20/30 ~~Silica~~	Type of Sand Pack Around Screen
34.5	Depth Bottom of Screen
35.0	Depth Bottom of Borehole/Sandpack

REMARKS:

GERAGHTY & MILLER, INC. Environmental Services

394

g:\proj\tf320\tbl\obswell2.xls

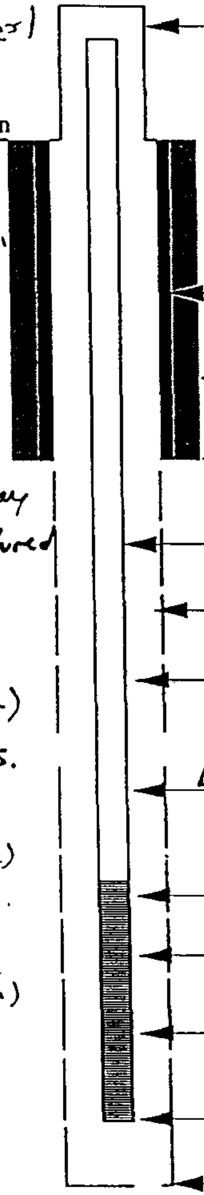
~~000197~~ JH 12/15/97

GROUNDWATER PIEZOMETER REPORT

Client. Sloss Industries
Location Birmingham, Alabama
Project No. TF0320.013
Contractor GRAVES SERVICE CO.
Driller(s) JOHN MITCHELL
Drilling Method(s) AIR HAMMER
Helper(s) J.B / DWIGHT
Prepared By J. KIRKPATRICK
Date(s) Installed JUNE 16, 1995

Boring No. ~~P-24 D~~ MW-30D JH 12/19/97

Survey Datum 564.43 ft amsl
KP 2/6/96
Ground Elevation 562.26 ft amsl



GENERAL SOIL CONDITIONS (Not to Scale)	Entry	Item
	4" STEEL	Type of Protective Cover
CLAY, reddish orange, tight w/ gravel.	NONE	ID of Surface Casing / Type of Surface Casing
	NA ~~NONE~~ JWK 1-16-95	Diameter of Borehole
19.0	NONE	Depth Bottom of Surface Casing
LIMESTONE, gray hard but fractured	SCH 40 PVC	Type of Riser Pipe
	5 3/4"	Diameter of Borehole
22.0 L.S. Fractured	PORTLAND TYPE I	Type of Grout Around Riser Pipe
26.0 (water zone)	34.6	Depth Top of Seal
28.5 Softer L.S.	Bentonite Pellets	Type of Seal
39.0 L.S., softer	37.9	Depth Bottom of Seal
46.0 (water zone)	48.5	Depth Top of Screen
Hard L.S.		
53 L.S. Soft	SCH 40 PVC 0.010" (#10 SLOT)	Type of Screen Section
55 (water zone)	20/30 Silica	Type of Sand Pack Around Screen
Hard L.S.		
57 L.S. Soft	58.5	Depth Bottom of Screen
59 (water)	59.0	Depth Bottom of Borehole/Sandpack

REMARKS:

GERAGHTY & MILLER, INC. Environmental Services

g:\proj\tf320\tbl\obs 395 x15

~~000193~~ JH 12/19/97

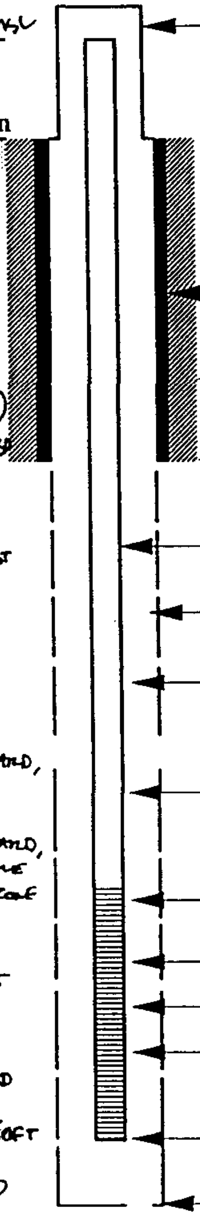
GROUNDWATER PIEZOMETER REPORT

Client: Sloss Industries
Site Location: Birmingham, Alabama
Well Location: AT SOUTH WESTERN END OF SWMU 39
Project No.: TF0320.015
Contractor: Graves Service Company Inc.
Driller(s): JOHN MITCHELL
Drilling Method(s): Hollow Stem Auger/Air Rotary
Helper(s): ALTON/DWIGHT/KEN
Prepared By: Joe Hughes
Date(s) Installed: 8/6/97 TO 8/13/97

Well/~~Piezometer~~ No. MW-31
SWMU Area: LD
SWMU: 39

Survey Datum: TOC 521.52 FT AMSL

Ground Elevation



GENERAL SOIL CONDITIONS (Not to Scale)

Depth	Soil Conditions
0	FLUE DUST + SOME CLAY
14	FILL (METAL, CONCRETE)
15	LIMESTONE, FRACT, HARD
17	LIMESTONE HARD
21	LIMESTONE BROKEN + VERY STIFF CLAY, MOIST
22	CLAY AS 21-22
	LIMESTONE, FRACT
26	LIMESTONE, VERY HARD, LITTLE CALCITE
28.5	LIMESTONE, MED HARD, FRACTURED W/ SOME WEATHERED LIMESTONE
29	LIMESTONE, HARD SOFT AT 33-33.25
35	LIMESTONE SOFT
38	LIMESTONE, HARD
41	LIMESTONE, MED SOFT
44.25	LIMESTONE HARD
47	

Item	Value
Type of Protective Cover	STEEL
ID of Surface Casing	6"
Type of Surface Casing	STEEL
Diameter of Borehole	10"
Depth Bottom of Surface Casing	19'
Type of Riser Pipe	2" PVC SCH 40
Diameter of Borehole	6"
Type of Grout Around Riser Pipe	TYPE I-II (8+ BAGS)
Depth Top of Seal	32
Type of Seal	BENTONITE PELLETS (1/2 BUCKET)
Depth Bottom of Seal	34
Depth Top of Screen	36.5
Screen Section Material	2" PVC SCH 40
Screen Size	0.010
Type of Sand Pack Around Screen	20/30 SAND 4 BAGS
Depth Bottom of Screen	46.5'
Depth Bottom of Borehole/Sandpack	47

REMARKS:

BORE HOLE MADE 5 TO 10 GPM FROM 35 TO 47 INTERVAL

GERAGHTY & MILLER, INC.
Environmental Services

g:\proj\tf320\tbl\obswell2.xls

GROUNDWATER PIEZOMETER REPORT

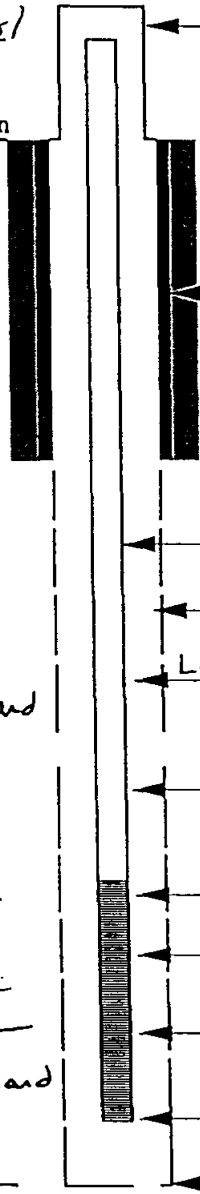
Client: Sloss Industries
Location: Birmingham, Alabama
Project No. TF0320.013
Contractor: GRAVES SERVICE CO.
Driller(s): JOHN BUTLER
Drilling Method(s): AIR HAMMER
Helper(s): J.B / DWIGHT
Prepared By: J. KIRKPATRICK
Date(s) Installed: JUNE 21 1995

Boring No. ~~PT~~ MW-32 JH 12/19/97

Survey Datum: 569.43 ft amsl
KB 2/6/96
Ground Elevation: 567.24 ft amsl

GENERAL SOIL CONDITIONS (Not to Scale)

SILTY SAND, black to brown (flue dust)
8.5
LIMESTONE
11.5
SILTY SAND, black creosote odor
18.5
LS, gray
19.5
SILTY SAND
22.0
LIMESTONE, hard gray
42.5
* LS w/ calcite
43.0
LIMESTONE, hard gray
47.5



4" STEEL	Type of Protective Cover
6" STEEL	ID of Surface Casing / Type of Surface Casing
9 7/8"	Diameter of Borehole
23.0	Depth Bottom of Surface Casing
SCH 40 PVC	Type of Riser Pipe
6 1/8"	Diameter of Borehole
Lehigh Portland Cement Type I-II	Type of Grout Around Riser Pipe
32.2	Depth Top of Seal
Bentonite Pellets	Type of Seal
34.7	Depth Bottom of Seal
37.0	Depth Top of Screen
SCH 40 PVC 0.010" SLOT (#10)	Type of Screen Section
20/30 Silica	Type of Sand Pack Around Screen
47.0	Depth Bottom of Screen
47.5	Depth Bottom of Borehole/Sandpack

REMARKS:

* water zone

GERAGHTY & MILLER, INC. Environmental Services

GROUNDWATER PIEZOMETER REPORT

Client: Sloss Industries — Site Location: Birmingham, Alabama

Well Location: 1/2 WAY BETWEEN MW-32 & 35 ON WEST SIDE OF ROAD

Project No.: TF0320.015

Contractor: Graves Service Company Inc. — Driller(s): JOHN

Drilling Method(s): Hollow Stem Auger/Air Rotary — Helper(s):

Prepared By: Joe Hughes — Date(s) Installed: 8/8/97 TO 8/11/97

Well/~~Piezometer~~ No.: MW-33

SWMU Area: LD

SWMU: 39

Survey Datum: 556.73 ft amsl

Ground Elevation

Type of Protective Cover	STEEL
ID of Surface Casing	6"
Type of Surface Casing	STEEL
Diameter of Borehole	10"
Depth Bottom of Surface Casing	26.5
Type of Riser Pipe	2" PVC SCH 40
Diameter of Borehole	6"
Type of Grout Around Riser Pipe	TYPE I-II (5 BAGS)
Depth Top of Seal	25
Type of Seal	BENTONITE PELLETS (1/2 BUCKET)
Depth Bottom of Seal	27
Depth Top of Screen	29
Screen Section Material	2" PVC SCH 40
Screen Size	0.010 SLOT
Type of Sand Pack Around Screen	20/30 SAND (4 BAGS)
Depth Bottom of Screen	39
Depth Bottom of Borehole/Sandpack	39.5

GENERAL SOIL CONDITIONS (Not to Scale)

Depth	Description
0	
	FLUE DUST
	SATURATED AT 4 FT
10	CLAY, PALEO LIME w/ LIGHT BROWN MOTTLING, w/ ROUNDED PEBBLES) / (CL)
14	
	LIMESTONE HARD, FRACTURED, DOLOMITIZED IN AREAS
20	LIMESTONE HARD MED TO SOFT
	LIMESTONE HARD
26.5	LIMESTONE, HARD, DRY
29.5	SOFT SPOT H_2O BEARING (4-5GPM)
33	SOFT SPOT TRACE TO SOME CALCITE FILLED VEINS
34.5	LIMESTONE, SHALY / SOFT
38	LIMESTONE, HARD
39	

REMARKS:

GERAGHTY & MILLER, INC. *Environmental Services*

g:\proj\tf320\tbl\obswell2.xls

GROUNDWATER PIEZOMETER REPORT

Client	Sloss Industries
Location	Birmingham, Alabama
Project No.	TF0320.013
Contractor	GRAVES SERVICES
Drilling Method(s)	AIR HAMMER
Prepared By	J. KIRKPATRICK
Driller(s)	JOHN MITCHELL
Helper(s)	J.B / DWIGHT
Date(s) Installed	JUNE 26 1995

Boring No. MW-34S ~~P-6S~~ JH 12/19/97

Survey Datum 545.98 ft amsl

KD 2/6/96

Ground Elevation 543.84 ft amsl

GENERAL SOIL CONDITIONS (Scale)

CLAY

11.25

L.S. Broken, soft

15.0

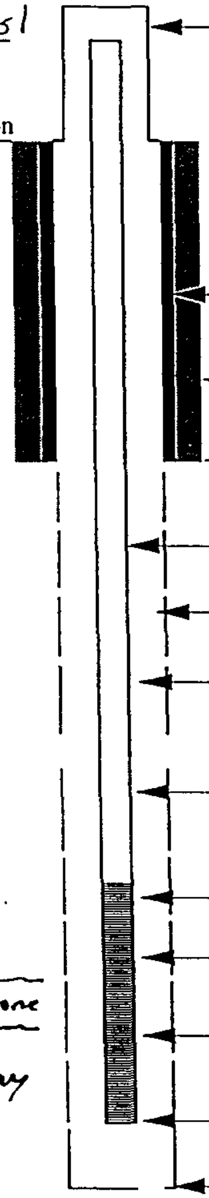
L.S. hard, gray, fine grained

29.5

* L.S. — water zone

30.25

L.S. Hard, gray



4" STEEL — Type of Protective Cover

6+" STEEL — ID of Surface Casing / Type of Surface Casing

9 7/8" — Diameter of Borehole

16.0 — Depth Bottom of Surface Casing

SCH 40 PVC — Type of Riser Pipe

6 1/8" — Diameter of Borehole

PORTLAND TYPE I — Type of Grout Around Riser Pipe

19.4 Depth Top of Seal

Type of Seal Bentonite

21.5 Depth Bottom of Seal

24.0 — Depth Top of Screen

SCH 40 PVC (0.010" SLOT) — Type of Screen Section

20/30 Silica — Type of Sand Pack Around Screen

34.0 — Depth Bottom of Screen

34.5 — Depth Bottom of Borehole/Sandpack

REMARKS:

* water zone

GERAGHTY & MILLER, INC. Environmental Services

g:\proj\tf320\tbl\obswell2.xls

~~000176~~ ~~[illegible]~~ JH 12/19/97

GROUNDWATER PIEZOMETER REPORT

Client	Sloss Industries
Location	Birmingham, Alabama
Project No.	TF0320.013
Contractor	GRAVES SERVICE CO.
Driller(s)	JOHN MITCHELL
Drilling Method(s)	AIR HAMMER
Helper(s)	JB / DWIGHT
Prepared By	J. KIRKPATRICK
Date(s) Installed	JUNE 21 1995

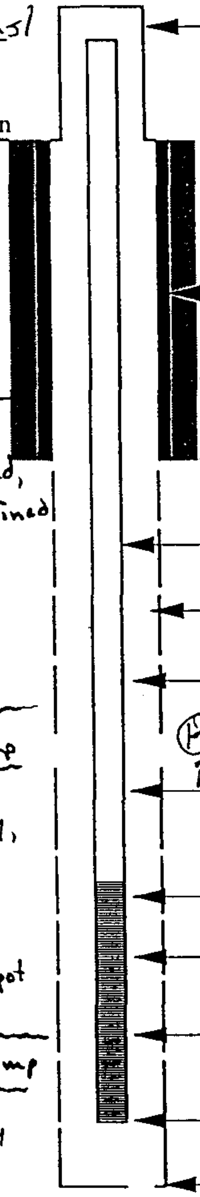
Boring No. MW-34D ~~P-6D~~ JH 12/19/97

Survey Datum 546.10 ft amsl

KB 2/6/96

Ground Elevation 544.00 ft amsl

GENERAL SOIL CONDITIONS ([illegible] to Scale)



CLAY,

12.0

L.S., gray, hard, dry, fine grained

119.0

SHALE, soft, damp

119.5

LIMESTONE, gray, hard.

152-152.5 - soft spot

168.0

L.S. w/ calcite, damp

170.0

LIMESTONE, gray

4" STEEL	Type of Protective Cover
6" STEEL	ID of Surface Casing / Type of Surface Casing
9 7/8"	Diameter of Borehole
16.0	Depth Bottom of Surface Casing
SCH 40 PVC	Type of Riser Pipe
5 3/4"	Diameter of Borehole
Portland Type I	Type of Grout Around Riser Pipe
KK 160 ~~58~~	Depth Top of Seal
Bentonite	Type of Seal
164 ?	Depth Bottom of Seal
168	Depth Top of Screen
SCH 40 PVC (0.010" SLOT)	Type of Screen Section
20/30 Silica	Type of Sand Pack Around Screen
178	Depth Bottom of Screen
181	Depth Bottom of Borehole/Sandpack

REMARKS: Took along time for sand to settle out through the viscous slough at bottom. Sand pushed the viscous slough up the borehole as it settled out. The bentonite bridged at the top of the slough at ~138 ft bls. Bentonite was tagged at ~160 ft bls on June 22, 1995. KK

GERAGHTY & MILLER, INC. Environmental Services

g:\proj\tf320\tbl\obswell2.xls

400

~~000177~~ JH 12/19/97

GROUNDWATER PIEZOMETER REPORT

Client: Sloss Industries | Site Location: Birmingham, Alabama

Well Location: MAIN PIPELINE ± 300 FT SOUTH NORTH OF ACCESS ROAD GATE

Project No. TF0320.015

Well/Piezometer No. MW-35

Contractor: Graves Service Company Inc. | Driller(s): JOHN MITCHELL

Drilling Method(s): Hollow Stem Auger/Air Rotary | Helper(s): ALTON / DWIGHT / RON

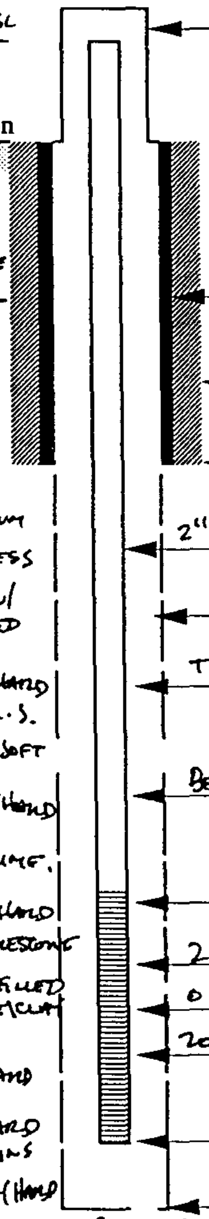
SWMU Area: LD

Prepared By: Joe Hughes | Date(s) Installed: 8/8/97 TO 8/14/97

SWMU: 39

Survey Datum: 542.12 ~~11.5~~ FT AMSL

Ground Elevation



GENERAL SOIL CONDITIONS (Not to Scale)

Depth	Soil Conditions
0	FLUE DUST
8	CLAY GRAYISH ORANGE TO LIGHT BROWN MOTTLED STIFF, SLIGHTLY MOIST (CL)
11.5	BROKEN ROCK LIMESTONE
15.5	LIMESTONE, HARD
19	LIMESTONE MEDIUM TO SOFT HARDNESS
20	LIMESTONE, HARD, W/ MINOR CALCITE FILLED VEINS
23	LIMESTONE, VERY HARD W/ THIN BEDDED L.S.
27	LIMESTONE, MED TO SOFT
29	LIMESTONE VERY HARD
32.75	SOFT SPOT FRACT LIME.
33	LIMESTONE VERY HARD W/ THIN BEDDED LIMESTONE
34	LIMESTONE W/ CALCITE FILLED VEINS, 3 STYLOLITIC SHALE/CLAY VERY HARD
37	LIMESTONE VERY HARD
39	LIMESTONE VERY HARD W/ SOME CALCITE VEINS
41	LIMESTONE VERY HARD
42	

Item	Value
Type of Protective Cover	STEEL
ID of Surface Casing	6"
Type of Surface Casing	STEEL
Diameter of Borehole	10"
Depth Bottom of Surface Casing	17
Type of Riser Pipe	2" PVC SCH 40
Diameter of Borehole	6"
Type of Grout Around Riser Pipe	TYPE I-II (3 BAGS)
Depth Top of Seal	15
Type of Seal	BENTONITE PELLETS (1/2 BUCKET)
Depth Bottom of Seal	17.5
Depth Top of Screen	19.5
Screen Section Material	2" PVC SCH 40
Screen Size	0.010 SLOT
Type of Sand Pack Around Screen	20/30 SAND (3.5 BAGS)
Depth Bottom of Screen	29.5
Depth Bottom of Borehole/Sandpack	30.5

BENTONITE 34.5 (1 BUCKET)

SAND 42 (2.5 BAGS)

REMARKS:

GERAGHTY & MILLER, INC. Environmental Services

g:\proj\tf320\tbl\obswell2.xls

GROUNDWATER PIEZOMETER REPORT

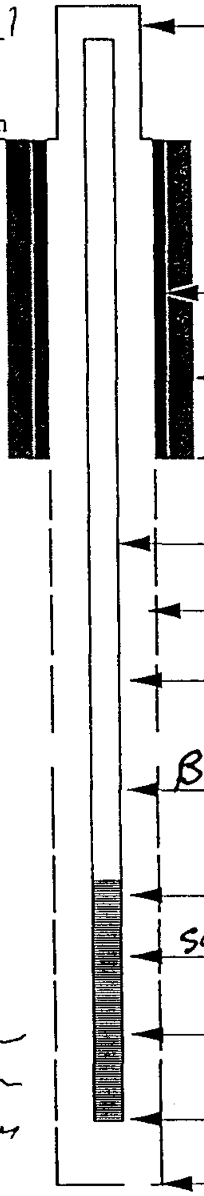
Client: Sloss Industries
Location: Birmingham, Alabama
Project No.: TF0320.013
Contractor: GRAVES SERVICE CO.
Driller(s): JOHN MITCHELL
Drilling Method(s): AIR HAMMER
Helper(s): J.B / DWIGHT
Prepared By: J. KIRKPATRICK
Date(s) Installed: JUNE 23 1995

Boring No. ~~P-5~~ MW-36 JH 12/19/97

Survey Datum: 532.43 ft amsl
KT 2/6/96
Ground Elevation: 530.34 ft amsl

GENERAL SOIL CONDITIONS (No Scale)

CLAY, yellowish brown, wet
14.5
LIMESTONE, gray, hard
132.0
* L.S. w/calcite
132.5
LIMESTONE, gray
137.0



Type of Protective Cover	4" STEEL
ID of Surface Casing / Type of Surface Casing	6+" STEEL
Diameter of Borehole	9 7/8"
Depth Bottom of Surface Casing	15.5
Type of Riser Pipe	SCH 40 PVC
Diameter of Borehole	6 1/8"
Type of Grout Around Riser Pipe	PORTLAND TYPE I
Depth Top of Seal	122.1
Type of Seal	Bentonite
Depth Bottom of Seal	124.5
Depth Top of Screen	126.5
Type of Screen Section	SCH 40 PVC 0.010" SLOT (#10)
Type of Sand Pack Around Screen	20/30 Silica Sand
Depth Bottom of Screen	136.5
Depth Bottom of Borehole/Sandpack	137.0

REMARKS:

* water zone

GERAGHTY & MILLER, INC. Environmental Services

g:\proj\tf320\tbl\obswell2.xls

~~000175~~ JH 12/19/97

GROUNDWATER PIEZOMETER REPORT

Client	Sloss Industries	Site Location	Birmingham, Alabama
Well Location	AT NE END OF SWMU		
Project No.	TF0320.015	Well/~~Piezometer~~ No.	MW-37
Contractor	Graves Service Company Inc.	Driller(s)	JOHN MITCHELL
Drilling Method(s)	Hollow Stem Auger/Air Rotary	Helper(s)	RON, ALTON, DWIGHT
		SWMU Area	LD
Prepared By	Joe Hughes	Date(s) Installed	8/8/97 TO 8/11/97
		SWMU	38

Survey Datum TOC 537.44

Ground Elevation

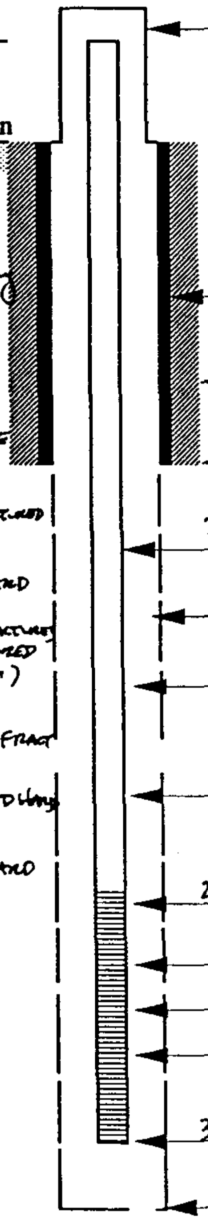
GENERAL SOIL CONDITIONS (Not to Scale)

0
2 COKE

CLAY, light brown w/ pale olive mottling stiff moist '(CL')

10.5 FRACTURED LIMESTONE
11.5 LIMESTONE, HARD
12.75
13.75 LIMESTONE, FRACTURED
LIMESTONE, HARD
18.25 CALCITE FILLED FRACTURES
LIMESTONE, FRACTURED
MAKES (15-20GPM)
19.25
LIMESTONE, SOFT, FRACT
21 LESS CALCITE
LIMESTONE, MOD HARD
23.5
LIMESTONE, HARD
SOFT AT 25 & 29

30



Item	Value
Type of Protective Cover	STEEL
ID of Surface Casing	6
Type of Surface Casing	STEEL
Diameter of Borehole	10"
Depth Bottom of Surface Casing	15'
Type of Riser Pipe	2" PVC SCH40
Diameter of Borehole	6"
Type of Grout Around Riser Pipe	TYPE I-II (3 BAGS)
Depth Top of Seal	14.5
Type of Seal	BENTONITE PELLETS (½ BUCKET)
Depth Bottom of Seal	16.5
Depth Top of Screen	20
Screen Section Material	2" PVC
Screen Size	0.010
Type of Sand Pack Around Screen	20/30 (4.5 50LB BAGS)
Depth Bottom of Screen	30
Depth Bottom of Borehole/Sandpack	30.5'

REMARKS:

GERAGHTY & MILLER, INC. *Environmental Services*

g:\proj\tf320\tbl\obswell2.xls

VOLUME I

APPENDIX A.6

WELL DEVELOPMENT LOGS

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.015 Well: MW-21
Location: Birmingham, Alabama Site ID: SWMU-23
Client: Sloss Industries Prepared by: J. Hughes

Method/Equipment:

Static DTW 19.93 TD 41.88 Pumping DTW ______ (ft below MP)

Pumping Rate ______ gpm Pumping Duration: ______

Specific Capacity ______ gpm/ft Q = ± 1.5 GPM

Water Removed During Development 40 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
9/5/97	940	7.56	1.05	20	Turbid >200	1 mg/L	20
	1030	7.71	1.02	23	Turb >200	5.2	30
	1100	8.05	1.05	24	Turb >200	7.5	35
	1125	7.97	1.03	24	Turb >200	7.2	37.5
	1150	7.85	1.01	24	25.5	7.2	40.0

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks:

g:\proj\tf320\tbf\welldev.xls

DONE

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

MW-22 JH 12/19/97

Project Name/No.	Sloss Industries TF0320.013	Well:	~~P-3+~~
Location:	Birmingham, Alabama	Site ID	
Client:	Sloss Industries	Prepared by:	J. KIRKPATRICK

Method/Equipment: TOTAL DEPTH - ~121 ft bTOC

1 volume = 6.6 gallons
5 Volumes = 33 gallons → +225 gal.

Static DTW 94.17 Pumping DTW ~110 (ft below MP)

Pumping Rate 1¼ to 1½ gpm Pumping Duration: ~ 4 hours

Specific Capacity NA gpm/ft

Water Removed During Development 275 gallons

STARTED - 1115
8/11/95

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped	WATER LEVEL
8/12/95	1200	6.71	520	21	10	2.44	55	—
8/14/95	2100	6.72	490	19	50	2.45	65	
8/14/95	2135	6.90	390	19	50	3.00	110	
8/14/95	2150	6.74	420	19	10	2.66	140	
8/14/95	2210	6.74	490	19	10	2.40	165	
8/14/95	2230	6.76	500	19	5	2.74	195	
8/14/95	2250	6.77	450	19	5	2.41	220	STOPPED PUMPING
8/15/95	0820	6.70	550	19	10	3.14	243	STARTED PUMPING 0811
8/15/95	0845	6.73	490	19	5	3.01	275	

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks:

VOLUME CALC. →

121.00
94.17
26.83

26.8
.16
1608
2680

6.6
5
330

g:\proj\tf320\tbl\welldev.xls

JH 12/19/97 407

~~000373~~

DONE

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: ~~R-30~~ MW-23 JH 12/19/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. KIRKPATRICK

Method/Equipment: TOTAL DEPTH - 81.8

1 Volume - 7.4 gallons
5 Volumes - 37 gallons

Static DTW 35.19 Pumping DTW NA (ft below MP)

Pumping Rate NA gpm Pumping Duration: Pumped dry repeatedly

Specific Capacity NA gpm/ft

Water Removed During Development 52 gallons

SPEC. CAP.
1 min. - 40.1
10 min. - 56.2

WATER LEVEL AFTER RECOVERY

STARTED: 1215
8/10/95

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped		WATER LEVEL
8/10/95	1235	5.54	160	22	>1000	0.96	15		
8/10/95	1300	5.77	160	22	>100	1.60	22		went dry
8/11/95	~~1020~~ 1030	5.55	150	21	>100	1.62	35	pumped dry	37.
8/13/95	1335	5.63	170	22	>100	1.36	45		37.4
8/13/95	1355	5.57	140	22	>100	1.43	52	Pumped dry	

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks:

VOLUME CALC.

81.80
35.19
46.61

46.6
.16
2796
4660

7.4
5
37.0

JH 12/19/97

g:\proj\tf320\tbl\welldev.xls

~~000312~~

408

DONE

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: ~~P29~~ MW-24 (SH) 12/19/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. KIRKPATRICK

Method/Equipment: TOTAL DEPTH - 76.50

1 Volume - 9.7 gallons
5 Volumes - 48.5 gallons.

Static DTW 15.59 Pumping DTW Pumped dry repeatedly (ft below MP)

Pumping Rate 1/2 gpm Pumping Duration: NA

Specific Capacity NA gpm/ft

Water Removed During Development 58 gallons

SPEC. CAP.
1 min - 21.9
10 min - 58.2

STARTED - 1020
8/10/95

STARTING WATER LEVEL AFTER RECOVERY

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped		WATER LEVEL
8/10/95	1045	5.82	320	22	>1000	1.03	16		
8/10/95	1115	5.94	290	22	>1000	3.15	20	Pumped dry	
8/11/95	1730	5.71	320	22	>100	3.77	32	Pumped Dry	15.98
8/13/95	1205	6.02	370	24	>100	6.26	45	Pumped Dry	16.03
8/14/95	1040	5.88	310	24	50	2.30	55		17.59
8/14/95	1100	5.89	310	24	50	3.61	58	Pumped dry	

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks:

VOLUME CALC.

76.50
15.59
60.91

60.9
.16
3654
6010

9.7
5
485

(SH) 12/12/97

g:\proj\tf320\tb\welldev.xl5

409

000311

DONE

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: ~~P-28S~~ MW-25S JH 12/19/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. KIRKPATRICK

Method/Equipment: TOTAL DEPTH - 48.8 ft BTOC

1 Volume = 4.2 gallons
5 Volumes = 21.0 gallons + 75 gallons

Static DTW 22.45 Pumping DTW see below (ft below MP)

Pumping Rate 1/2 to 1/4 gpm rate is fluctuating Pumping Duration: 2 hrs.

Specific Capacity NA gpm/ft

SPEC. CAP.
1 min - 27.65
10 min - 40.1

Water Removed During Development 90 gallons

STARTED - 0945
8-14-95

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped	WATER LEVEL
8-14-95	1015	6.92	710	24	50	1.25	20	41.2
8-14-95	1045	7.01	720	24	50	4.07	38	44.3
8-14-95	1115	6.96	730	24	40	3.48	55	42.3
8-14-95	1145	6.96	750	24	30	2.61	~~80~~ 70	42.6
8-14-95	1220	6.92	740	24	30	2.48	90	42.1

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks:

48.80
22.45
26.35

26.4
.16
1584
2640
[illegible]

1 Volume - 4.2
5
21.0

~~000309~~ JH 12/19/97

g:\proj\tf320\tbl\welldev.xls

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: ~~P-28D~~ MW-25D JK 12/19/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. KIRKPATRICK

Method/Equipment: TOTAL DEPTH - 70.1 ft bTOC 1 Volume - 7.8 gallons
5 Volumes - 39 gallons, + 75 gal.

Static DTW 21.45 Pumping DTW NA (ft below MP)

Pumping Rate 1/2 to 1/4 gpm Pumping Duration: Pumped dry repeatedly

Specific Capacity NA gpm/ft

SPEC. CAP.
1 min - 35.1
10 min - 61.1

Water Removed During Development 50 gallons

STARTED - 0820
8-14-95

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped		WATER LEVEL
8/14/95	~~0845~~	11.81	4360	25	>1000	3.88	12	Pumped dry	~70
8/14/95	1900	11.61	2130	25	100	2.88	23	Pumped dry	21.58
8/15/95	0930	11.49	1110	25	100	4.23	33	Pumped dry	18.
8/15/95	1820	10.84	660	25	80	3.09	38		24.
8/15/95	1830	10.90	600	25	80	4.13	41	Pumped dry	
8/16/95	1830	10.88	600	25	85	—	50	Pumped dry	

~~STATIC~~ WATER LEVEL AFTER RECHARGE

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks:

70.10
21.45
48.65

48.7
.16
2922
487
[illegible]

7.8
5
39.0

g:\proj\tf320\tbf\welldev.xl5

~~000310~~ JK 12/19/97

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013
Location: Birmingham, Alabama
Client: Sloss Industries

Well: ~~P-27~~ MW-26 JH 12/19/97
Site ID
Prepared by: J. HUGHES

Method/Equipment: TOTAL DEPTH - 142 ft bTOC

1 Volume - 8.22
5 Volumes - 40 gallons

Static DTW 90.65 Pumping DTW NA (ft below MP)

Pumping Rate 1/2 to 1/4 to start gpm Pumping Duration: Pumped dry repeatedly or Bailed dry repeatedly

Specific Capacity NA gpm/ft

Water Removed During Development 14 gallons

STARTED - 1020
8-3-95

Water Quality and Observations

DEPTH TO WATER AFTER RECHARGE

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped	Depth to Water After Recharge	
8/3	1035	8.59	980	25	>1000	1.50	8.6	140	
8/3/95	1115	8.53	1060	21	>1000	1.71	12		pumped dry
8/12/95	1600	8.60	1020	24	>1000	→	13		pumped dry
8/14/95	1500	8.04	1640	25	>1000	3.87	13.5	140	bailed dry
8/15/95	1400	7.97	1780	25	>1000	4.64	13.75	141	bailed dry
8/26/95	1500	8.06	1760	25	>1000	4.02	14.00	141	bailed dry

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: Very slow recharge - Will continue development w/ a bailer. (Sheen on water)

142.00
90.65
51.35

51.38
.16
3084
5140
8224

8.22 1 volume.

g:\proj\tf320\tbl\welldev.xl5

~~000308~~ JH 12/19/97

412

DONE

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: MW-27 ~~P-26~~ JH 12/19/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. KIRKPATRICK

Method/Equipment: TOTAL DEPTH - 39.4 1 Volume - 3.4 5 Volumes - 17.5

Static DTW 17.75 Pumping DTW ~18 (see below) (ft below MP)

Pumping Rate 1 gpm Pumping Duration: 1 hour

Specific Capacity NA gpm/ft

Water Removed During Development 55 gallons

SPEC. CAPACITY
1 min - 18.40
10 min - 18.20

STARTED: 1115

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped	WATER LEVEL
8/9/95	1125	6.62	770	21	<10 NTU's	0.72	10	18.21
8/9/95	1135	6.66	840	21	<10	0.84	25	18.12
8/9/95	1145	6.63	800	21	<10	0.72	32	18.16
8/9/95	1155	6.62	850	21	<10	0.80	43	18.16
8/9/95	1210	6.65	840	21	<10	0.56	55	

reduced rate slightly

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: NO WATER ADDED DURING DRILLING

VOLUME CALC.

39.40 − 17.75 = 21.65

21.6 × .16 = 1296 / 2160 / 3.456

3.5 × 5 = 17.5

g:\proj\tf320\tbl\welldev.xls

~~000307~~ 12/19/97

413

DONE

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: ~~P-25~~ MW-28 JH 12/19/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. HUGHES

Method/Equipment:

Static DTW 19.98 Pumping DTW 25.80 (1MIN) 28.29 (10MIN) 28.52 (20MIN) 28.71 (35MIN) 50GAL (ft below MP)

Pumping Rate ~ 1½ gpm Pumping Duration: 1.25 HR

Specific Capacity NA gpm/ft

Water Removed During Development 55 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
7/20/95		6.94	610	25	3.06	3.34	10
		6.94	630	25	2.04	3.04	20
		6.99	630	25	1.41	2.86	43
		6.96	510	25	1.57	2.42	55

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: No drilling water added.

g:\proj\tf320\tbl\welldev.xl5

~~000306~~ JH 12/19/97

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.015 Well: MW-29
Location: Birmingham, Alabama Site ID SWMW 38
Client: Sloss Industries Prepared by: J. Wheeler

Method/Equipment:

Static DTW 20.25 Pumping DTW 20.54 (ft below MP)

Pumping Rate ______ gpm Pumping Duration: ______

Specific Capacity ______ gpm/ft TD 30.85

Water Removed During Development 100 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
8/19/97	1320	7.05	0.67	23	>200	1.2	5
	1325	7.86	0.55	23	14.45	1.3	15
	1340	7.55	0.51	22	16.85	3.8	50
	1345	7.50	0.50	22	16.68	1.5	55
	1405	7.53	0.48	22	>200*	1.5	65
	1415	7.52	0.47	22	18.7	1.7	75
	1420	7.53	0.53	22	25.4 B	1.5	85
	1425	7.45	0.53	22	60.6	2.4	105

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: * TURB UP, AFTER RESTARTING PUMP
B · METER MALFUNCTION

g:\proj\tf320\tbl\welldev.xl5

DONE

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: ~~P-2~~ MW-30 S JH 12/19/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. Weites

Method/Equipment:

Static DTW 25.56 Pumping DTW 27.01 (1MIN) 27.10 (10MIN) 21.17 (20MIN) (ft below MP) (48GAL IN 20MIN)

Pumping Rate ~1 gpm Pumping Duration: 1 Hr

Specific Capacity NA gpm/ft

Water Removed During Development 55 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
7/28/95		6.70	580	25	17.7	7.90	10
|		6.75	680	25	6.97	6.04	20
|		6.73	630	25	4.93	4.98	30

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: No drilling water added.

g:\proj\tf320\tbl\welldev.xls

~~000304~~ JH 12/19/97

DONE

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: ~~R-240~~ MW-30D JH 12/19/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. HUGHES

Method/Equipment:

Static DTW 24.85 Pumping DTW 29.70 (1 MIN) 33.51 (10 MIN) 33.95 (30 MIN) (ft below MP) 33.95 (38 MIN)

Pumping Rate ~1/2 gpm Pumping Duration: 2

Specific Capacity NA gpm/ft

Water Removed During Development 55 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
7/27/95		7.13	420	23	97.3	2.46	10
↓		7.10	520	22	9.09	6.71	20
		7.17	500	22	5.41	6.01	30

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: No water added during drilling.

g:\proj\tf320\tbl\welldev.xl5

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.015 Well: MW-31
Location: Birmingham, Alabama Site ID [illegible]
Client: Sloss Industries Prepared by: [illegible]

Method/Equipment:

Static DTW 19.92 Pumping DTW 49.27 (ft below MP)

Pumping Rate ______ gpm Pumping Duration: ______

Specific Capacity ______ gpm/ft

Water Removed During Development 55 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped	
8/5/97	1555	7.33	0.62	25	98.3*	2.7	20	
	1605	7.37	0.57	26	105.8*	2.0	25	GPM ≅ 0.5
	1615	7.39	0.60	26	40.5	1.7	30	"
	1620	7.58	0.62	24	3.1	3.0	35	IN GPM TO ≅ 1
	1630	7.43	0.58	26	2.3	1.7	40	"
	1635	7.62	0.62	25	179.7*	2.2	45	GPM ≅ 0.5
	1645	7.63	0.62	25	28.6* [illegible]	1.7	47.5	"
	1650	7.62	0.61	24	5.6	1.6	50	GPM ≅ 1
	1655	7.62	0.58	24	4.3	1.4	52.5	"
	1700	7.63	0.62	24	4.1	1.3	56	"

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: * METER MALFUNCTION

DONE

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: ~~P-7~~ MW-32 JH 12/9/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. KIRKPATRICK

Method/Equipment: TOTAL DEPTH - 49.9 BTOC

1 Volume = 5 gal.
5 Volume = 25 gal

JWK 8-29-95

Static DTW 18.64 Pumping DTW ~~48~~ (ft below MP)

Pumping Rate 1/2 to 3/4 gpm Pumping Duration 2 hrs.

Specific Capacity NA gpm/ft

Water Removed During Development 55 gallons

SPEC. CAP.
1 min — 28.90
10 min - 34.55

STARTED: 1430

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
8/8	1440	6.72	1970	25	5.4	1.21	8
8/8	1455	6.63	2040	24.5	5.4	1.33	18
8/8	1517	6.61	2070	24	3.0	1.02	24
8/8	1535	6.62	2060	23	0.9	0.96	35
8/8	1610	6.65	2030	23	0.8	1.00	~~50~~ 46
8/8	1625	6.66	2040	23	0.9	1.02	55

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: No water added during drilling.

49.90
18.64
31.26

31.3
.16
1878
3130
5.008

5.0
5
25.0 Gallons.

JH 12/9/97

g:\proj\tf320\tbf\welldev.xl5

~~000285~~

419

GERAGHTY
& MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No.	**Sloss Industries** TF0320.015	Well:	Mw-33
Location:	**Birmingham, Alabama**	Site ID	SWMU 39
Client:	**Sloss Industries**	Prepared by:	[illegible]

Method/Equipment:

Static DTW 7.96 41.40 Pumping DTW 31.86 (ft below MP)

Pumping Rate 1.37 gpm Pumping Duration: 1.25 Hrs

Specific Capacity ____________ gpm/ft

Water Removed During Development 110 gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
8/6/97	915	6.43	0.87	23	2.63	1.7	20
	935	6.80	0.72	23	4.2	1.1	40
	950	6.83	0.88	23	6.1	3.3	55
	1005	6.45	0.93	23	28.9	1.3	75
	1020	6.48	0.96	23	30.7	2.2	95
	1030	6.51	0.92	23	6.6	3.5	105
	1035	6.49	0.93	23		2.2	110

1.37
80)110
80
300
240
600
560

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks:

g:\proj\tf320\tbl\welldev.xl5

DONE

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: ~~P-65~~ MW-34S JH 12/19/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. KIRKPATRICK

Method/Equipment: TOTAL DEPTH - 36.4

Static DTW 7.81 Pumping DTW ~~35~~ JWK 8-29-95 (ft below MP)

SPEC. CAP.
1 min - 11.05
10 min - 14.91

Pumping Rate 1 1/4 gpm Pumping Duration: 1.25 hrs.

Specific Capacity NA gpm/ft

1 Volume = 9.5 gallons
5 Volumes = 47.5 gallons.

Water Removed During Development 110 gallons

47.5 GAL

STARTED : 1200

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO mg/L	Gallons Pumped
8/8	1213	6.53	1640	22	10	1.06	18
8/8	1226	6.51	1650	22	10	0.96	31
8/8	1237	6.50	1630	24	10	1.18	46
8/8	1249	6.51	1630	22	10	0.82	65
8/8	1302	6.51	1640	22	10	0.80	82
8/8	1318	6.51	1640	22	10	0.83	110

← increase rate, 2 gpm

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: No water added during drilling.

36.40
7.81
28.59

28.6
.16
1716
2860
9.576

9.5
5
475

JH 12/19/97

g:\proj\tf320\tbl\welldev.xls

~~000283~~

421

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013
Location: Birmingham, Alabama
Client: Sloss Industries

Well: ~~P-6D~~ MW-34D (JH) 12/19/97
Site ID
Prepared by: J. KIRKPATRICK

Method/Equipment: TOTAL DEPTH ~ ~182'

1 Volume = 11 gallons
5 Volumes = 55 gallons.

Static DTW 111.2 Pumping DTW see below (ft below MP)

Pumping Rate 1/2 to 1/4 gpm
rate ↓ as depth ↑

Pumping Duration: Pumped/Bailed dry repeatedly

Specific Capacity NA gpm/ft

Water Removed During Development 25 gallons

STARTED - 1255
8-12-95

INITIAL WATER LEVEL (AFTER RECHARG at 1/4 gpm pumped dry

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped		
8/12/95	1525	8.20	1210	24	50	0.43	16		
8/13/95	1820	7.96	1330	22	>100	1.83	21		161.5
8/13/95	1640	7.84	1420	22	>100	2.34	22	bailed dry	
8/14/95	1445	7.88	1340	22	>100		23	"	176.[illegible]
8/15/95	1345	7.85	1210	24	>100	5.29	24	"	176.30
8/16/95	1200	8.04	1280	24	>100	—	25	"	
8									

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: 8/12/95 pumped dry (16 gallons) 8/13/95 bailed dry (6 gallons)
8/14/95 Bailed dry (3/4 gallon). 8/15/95 BAILED DRY (1 GALLON)

35.1
14.6
20.5

g:\proj\tf320\tbf\welldev.xls

~~000284~~ (JH) 12/15/97

GERAGHTY & MILLER, INC. *Environmental Services*

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.015 Well: MW-35
Location: Birmingham, Alabama Site ID SMW39
Client: Sloss Industries Prepared by: J. Wedge

Method/Equipment:

Static DTW 6.50 TD 32.30 Pumping DTW ______ (ft below MP)

Pumping Rate ______ gpm Pumping Duration: ______

Specific Capacity ______ gpm/ft

Water Removed During Development ______ gallons

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped	
8/16/97	18:05	6.97	1.86	24	>200	6 mg/L	20 gal	
8/17/97		6.97	1.55	25	111.9	3 mg/L	3	BAILED DRY
8/17/97	1925	6.61	1.65	22	110	6.2 mg/L	3	BAILED DRY
8/18/97	18 50	7.03	1.72	23	45	6.5 mg/L	2.5	BAILED DRY
8/19/97	15 40	7.04	1.69	21	6.5	6.0	1	BAILED DRY
							29.5	TOTAL

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks:

g:\proj\tf320\tbl\welldev.xls

GERAGHTY & MILLER, INC.
Environmental Services

Done

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.013 Well: ~~P-5~~ MW-36 JK 12/19/97
Location: Birmingham, Alabama Site ID
Client: Sloss Industries Prepared by: J. KIRKPATRICK

Method/Equipment: TOTAL DEPTH - 139' 1 VOLUME - 22.2 gallons. 5 Volumes - 111 gallons.

Static DTW 0.0 (artesian) Pumping DTW see below (ft below MP)

Pumping Rate 1.5 gpm Pumping Duration: 2.5 hrs.

Specific Capacity NA gpm/ft

SPEC CAP.
At ~4 gpm { 1 min - 8.2 ; 10 min - 45.2

Water Removed During Development 155 gallons

STARTED - 1600

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped	WATER LEVEL
8/9/95	1615	9.06	980	20.5	~100		33	
8/9/95	1640	9.04	950	21	~100	0.77	65	
8/9/95	1700	9.05	950	21	~100	0.54	85	51.
8/9/95	1730	9.10	970	20.5	<100	1.02	97	50.2
8/9/95	1800	9.10	950	20.5	<100	0.50	135 ← Increased Rate to ~3 gpm	
8/9/95	1815	9.10	970	20.5	<100	0.79	155	60.3

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks: ~25 gallons added during drilling so we will remove an additional ~50 gallons.

139
.16
834
1390
2224

22.2
5
111.0

JK 12/19/97

~~000282~~

g:\proj\tf320\tbf\welldev.xl5

424

GERAGHTY & MILLER, INC.
Environmental Services

WELL DEVELOPMENT SUMMARY

Project Name/No. Sloss Industries TF0320.015 Well: MW-37
Location: Birmingham, Alabama Site ID Snow 3B
Client: Sloss Industries Prepared by: J. Hughes

Method/Equipment:

Static DTW 3.79 TD 30.20 Pumping DTW 8.71 (ft below MP)

Pumping Rate 1.6 gpm Pumping Duration: 1.0

Specific Capacity ______ gpm/ft

Water Removed During Development 110 gallons

1.6
65) 110
65
450

Water Quality and Observations

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped
8/6/97	1150	6.42	0.69	23	47.5	1.2	30
	1200	6.26	0.67	23	51.3	1.1	55
	1210	6.27	0.68	23	50.9	1.4	75
	1220	6.35	0.64	22	62.0	1.0	95
	1230	6.31	0.64	23	57	1.3	110

Sample

Date	Time	pH	SC	Temperature °C	Visual/ Turbidity	DO	Gallons Pumped

Remarks:

g:\proj\tf320\tb\welldev.xls

VOLUME I

APPENDIX A.7

WATER LEVEL MEASUREMENTS

MULTIPLE WELL MEASUREMENTS

Sloss Industries

Birmingham, Alabama

	Well Number	Date	Time	Depth to Product	Depth to Water	Remarks
	P-1S	8/17/97	1120		16.60	
	P-1D		1120		17.00	
	P-2		1104		13.92	
	P-3		1100		10.95	
	P-4		1155		11.52	
MW-36	P-5		1330		2.71 ATOC	
	P-6S		1349		6.37	
W-34S	P-6D		1350		5.69	
W-34D	P-7		1340		16.84	
W-32	P-8		1343		7.57	
	P-9		1405		162.54	
	P-10		1410		12.50	
	P-11		1413		6.44	
	P-12		1415		6.14	
	P-13S		1417		9.68	
	P-13D		1418		114.83	
	P-14		1430		9.11	
	P-15		1425		5.79	
	P-16		1232		5.52	
	P-17		1220		5.06	
	P-18		1236		11.05	
	P-19S		1245		4.51	
	P-19D		1240		4.29	
	P-20		1247		82.15	
	P-21		1258		121.41	
	P-22		1300		10.56	
	P-23		1305		17.02	
W-30S	P-24S		~~21.17~~ 1310		21.17	
MW-30D	P-24D		1310		20.67	
MW-28	P-25		1317		16.31	
MW-27	P-26		1335		16.09	
MW-26	P-27		1333		85.48	
MW-25S	P-28S		1055		17.87	
MW-25D	P-28D		1055		17.17	
MW-24	P-29		1053		12.97	
MW-23	P-30		1050		~~12.97~~ 31.98	
MW-22	P-31		1045		93.62	
	P-32		1255		5.62	
	MW-5		1157			No Reading Wasp KT
	MW-6					
	SG-1					Knockdown No Reading KT
	SG-2		1112		1.12	
	SG-3		1130		13.07	
	SG-4	8/17/97	1143		0.96	

MW-21	1025	15.30
MW-25	1315	20.55
MW-31	1338	20.74
MW-33	1345	8.18
MW-35	1510	26.33
MW-37	1505	3.84

KT 10-28-97

VOLUME I

APPENDIX A.8

GROUNDWATER SAMPLING LOGS

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 1 of 20

Site Location Birmingham, Alabama Site/Well No. MW-21

Sample I.D. 970818-LD-23-GW0021 Coded/Replicate No. Date 8/18/97

Weather Sunny 90's Purge Begin 1305 Purge Ended 1400 Time Collected 1410

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface ____ MP Elevation ____

Total Sounded Depth of Well Below MP 41.88 Water-Level Elevation ____

Depth of Water Below MP 15.25 Diameter of Casing 2"

Water Column in Well 26.63 Total Purge Volume 25

Gallons per Foot 4.2608 x5 Sampling Pump Intake

Gallons in Well 0.16 = 21.30 (feet below MP) 40.00

41.88 / 15.25 / 26.63 / 26.63 / .16 / 15978 / 2.6630 / 4.26 / 5 / 21.30 / 3

Evacuation Method 2" sub pump

SAMPLING DATA/FIELD PARAMETERS

Color Lt Brown Odor — Appearance Stirred Temperature 25/25/25 °C

Specific Conductance (mmhos/cm) 1.34/1.26/1.32 pH 7.07/7.28/7.30 Dissolved Oxygen 6.0/7.6/7.6 mg/L

Turbidity >200/>200/28.9 NTUs Eh ____ mV 10 Gal/15 Gal/25

Other ____

CONTAINER DESCRIPTION

Constituents Sampled | From Lab X or G&M ____ | Preservative

Constituents Sampled	Container	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks ____

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 2 of 20

Site Location Birmingham, Alabama Site/Well No. MW-32

Sample I.D. 970818 -LD-23 -GW0032 Coded/ Replicate No. — Date 8 / 18 / 97

Weather Sunny 90's Purge Begin 1125 Purge Ended 1200 Time Collected 1205

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	± 2	MP Elevation	
Total Sounded Depth of Well Below MP	122.00	Water-Level Elevation	
Depth of Water Below MP	93.45	Diameter of Casing	2"
Water Column in Well	28.55	Total Purge Volume	25
Gallons per Foot	0.16	Sampling Pump Intake	
Gallons in Well	4.5680	(feet below MP)	±105

28.55
.16
17130
28550
4.5680

Evacuation Method 2" Sub. Pump

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor — Appearance Clear Temperature 22/21/22/21 °C

Specific Conductance (mmhos/cm) 0.51/0.52/0.52/0.53 pH 6.86/6.85/6.88/6.80 Dissolved Oxygen 2.6/2.5/2.8/2.4 mg/L

Turbidity >200/11.06/10.10/ NTUs Eh ____ mV 10 Gal/15 Gal/20 Gal/

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 3 of 20

Site Location Birmingham, Alabama Site/Well No. MW-23

Sample I.D. 970818 -LD-23 -GW0023 Coded/ Replicate No. — Date 8 / 18 / 97

Weather Sunny 90's Purge Begin 1510 Purge Ended 1645 Time Collected 1655

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	±2.5	MP Elevation	
Total Sounded Depth of Well Below MP	81.8	Water-Level Elevation	
Depth of Water Below MP	32.05	Diameter of Casing	
Water Column in Well	49.75	Total Purge Volume	
Gallons per Foot	0.16	Sampling Pump Intake	
Gallons in Well	7.960 x 5 = 40	(feet below MP)	80

81.80
32.05
49.75 8x5
.16
7.960

Evacuation Method 2" SUBMERSIBLE PUMP

SAMPLING DATA/FIELD PARAMETERS

Color LT YELLOW Odor — Appearance TURBID Temperature 22/22/23/23C

Specific Conductance (mmhos/cm) 0.17/0.17/0.17/0.17 pH 5.70/5.70/5.84/5.78 Dissolved Oxygen 1.8/1.4/1.6/2.2 mg/L

Turbidity 2200/2200/56/27 NTUs Eh ____ mV 15GAL/22GAL/25GAL/40

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks WELL WENT DRY 2 TIMES DURING PURGE

...pling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number: Sloss Industries / TF0320.015 Page 4 of 20

Site Location: Birmingham, Alabama Site/Well No. MW-2d

Sample I.D.: 970818 -LD-23 -GW 0024 Coded/Replicate No. MS/MSD Date 8 / 18 / 97

Weather: overcast Purge Begin 1740 Purge Ended 1840 Time Collected 1850

EVACUATION DATA

Description of Measuring Point (MP): TOC

Height of MP Above/Below Land Surface	+2.5	MP Elevation	
Total Sounded Depth of Well Below MP	76.50	Water-Level Elevation	
Depth of Water Below MP	13.04	Diameter of Casing	2"
Water Column in Well	63.46	Total Purge Volume	30
Gallons per Foot	0.16	Sampling Pump Intake	
Gallons in Well	10.15 X5 = 50.75	(feet below MP)	75

76.50
13.04
63.46
.16
38076
63460
10.1536
2
10.15
50.75

Evacuation Method: 2" submersible pump

SAMPLING DATA/FIELD PARAMETERS

Color: LT brown Odor: — Appearance: Turbid Temperature: 22/21/21 °C

Specific Conductance (mmhos/cm): 0.31/0.29/0.29 pH 5.49/5.95/5.91 Dissolved Oxygen 1.3/2.3 mg/L

Turbidity: >200/200/>200 NTUs Eh ____ mV 20 gal/15 30/25

Other:

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks: Pumped dry 3 times

Sampling Personnel: Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 5 of 20

Site Location Birmingham, Alabama Site/Well No. MW-25S

Sample I.D. 970819 -LD- 23 -GW0025S Coded/ Replicate No. — Date 8 / 19 / 97

Weather Sunny 80's Purge Begin 1200 Purge Ended 1220 Time Collected 1225

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	+2.5	MP Elevation	
Total Sounded Depth of Well Below MP	48.80	Water-Level Elevation	
Depth of Water Below MP	17.85	Diameter of Casing	2"
Water Column in Well	30.95	Total Purge Volume	
Gallons per Foot	0.16	Sampling Pump Intake	
Gallons in Well	4.96 x 5 = 20	(feet below MP)	48

48.80 − 17.85 = 30.95; 31 × .16 = 186 + 310 = 4.96

Evacuation Method 2" Submersible Pump

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor — Appearance — Temperature 23/22/22 °C

Specific Conductance (mmhos/cm) 0.79/0.77/0.78/ pH 7.45/7.55/7.44 Dissolved Oxygen 2.8/1.6/1.5 mg/L

Turbidity 2.5/2.5/ NTUs Eh mV 5gal/10gal/15gal/

Other

CONTAINER DESCRIPTION

From Lab X or G&M

Constituents Sampled	Container	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 6 of 20

Site Location Birmingham, Alabama Site/Well No. MW-25D

Sample I.D. 970819 -LD-23 -GW0025D Coded/ Replicate No. GUARDIAN SPLIT 970819-LD-23-GW90025D Date 8 / 19 / 97

Weather OVERCAST 70's Purge Begin 920 Purge Ended 1000 Time Collected 1030

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	±2.5	MP Elevation	
Total Sounded Depth of Well Below MP	70.1	Water-Level Elevation	
Depth of Water Below MP	17.15	Diameter of Casing	2"
Water Column in Well	52.95	Total Purge Volume	
Gallons per Foot	8.48x5=42.40	Sampling Pump Intake (feet below MP)	68
Gallons in Well	0.16		

6, 70.10 53
17.15 .16 ∑ 4
52.95 318 8.48
530 5
42.40
8.48

Evacuation Method 2" SUBMERSIBLE PUMP

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor – Appearance TURBID Temperature 22/24 °C

Specific Conductance (mmhos/cm) 0.45/1.00 pH 7.95/10.42 Dissolved Oxygen 2.1 mg/L

Turbidity >200/>200 NTUs Eh mV 15GAL/20GAL

Other

CONTAINER DESCRIPTION

Constituents Sampled — From Lab X or G&M — Preservative

Constituents Sampled	Container	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks 970819-LD-23-FB0002 & 970819-LD-23-EB0002 COLLECTED PRIOR TO PURGE

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 7 of 20

Site Location Birmingham, Alabama Site/Well No. MW-26

Sample I.D. 970820 -LD-38 -GW0026 Coded/ Replicate No. – Date 8/20/97

970821-LD-38-GW0026

Weather OVERCAST 70's Purge Begin 920 Purge Ended 930 Time Collected 930

SAMPLE NOT SUBMITTED JH 12/19/97

8/21/97 1750 SAMPLE SUBMITTED JH 12/19/97

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface ±2.5 MP Elevation

Total Sounded Depth of Well Below MP 142 Water-Level Elevation

Depth of Water Below MP 85.40 Diameter of Casing 2"

Water Column in Well 56.60 Total Purge Volume 5

Gallons per Foot 0.16 Sampling Pump Intake

Gallons in Well 9.1x5 = 46 (feet below MP)

142.00
85.40
56.60

56.6
.16
3396
5660
9056
9.1
5
45

Evacuation Method 2" SUBMERSIBLE PUMP

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor SULFUR HCARBON Appearance SHEEN – Temperature 22/20 °C

Specific Conductance (mmhos/cm) 2.51/2.85 pH 7.79/7.83 Dissolved Oxygen 0.9/1.3 mg/L

Turbidity 1.55/720 NTUs Eh mV

Other

CONTAINER DESCRIPTION

Constituents Sampled — From Lab X or G&M — Preservative

Constituents Sampled	Container	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks COULD NOT GET ALL BUBBLES OUT OF VOCS DUE TO EFFERVESCENCE CAUSED BY ACID

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 8 of 20

Site Location Birmingham, Alabama Site/Well No. Mw-27

Sample I.D. 970819 -LD-38 -GW0027 Coded/ Replicate No. — Date 8 / 19 / 97

Weather Hot 90's Purge Begin 17:20 Purge Ended 17:45 Time Collected 17:50

EVACUATION DATA

Description of Measuring Point (MP) Toc

Height of MP Above/Below Land Surface ±2.5 Ft MP Elevation

3 Total Sounded Depth of Well Below MP 39.4 Water-Level Elevation

39.40
16.05
Depth of Water Below MP 16.05 Diameter of Casing 2"

23.35 3.7360
Water Column in Well 23.35 Total Purge Volume

.16
Gallons per Foot 0.16 Sampling Pump Intake

14010
23350
Gallons in Well 3.736 x5 = 20 (feet below MP)

Evacuation Method 2" SUBMERSIBLE PUMP

SAMPLING DATA/FIELD PARAMETERS

Color None Odor None Appearance Clear Temperature 20 °C

Specific Conductance (umhos/cm) m 0.84 pH 6.56 Dissolved Oxygen 1.8 mg/L

Turbidity 1.97 NTUs Eh mV

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 9 of 20

Site Location Birmingham, Alabama Site/Well No. MW-28

Sample I.D. 970819 -LD-38 -GW0028 Coded/ Replicate No. — Date 8 / 19 / 97

Weather Sunny 90's Purge Begin 1915 Purge Ended 1945 Time Collected 1950

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface ±2.5 MP Elevation

Total Sounded Depth of Well Below MP 60.50 Water-Level Elevation

Depth of Water Below MP 16.28 Diameter of Casing 2"

Water Column in Well 44.22 Total Purge Volume 40 GAL

Gallons per Foot 0.16 Sampling Pump Intake (feet below MP) 50

Gallons in Well 7.08 x 5 = 35.4

60.50 − 16.28 = 44.22; 44.22 × .16 = 7.08; 7.08 × 5

Evacuation Method 2" Submersible Pump

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor Sulfur Appearance — Temperature 23 °C

Specific Conductance (mmhos/cm) 0.61 pH 7.28 Dissolved Oxygen 1.9 mg/L

Turbidity 5.1 NTUs Eh mV

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 10 of 20

Site Location Birmingham, Alabama Site/Well No. MW-29

Sample I.D. 970819 -LD-38 -GW 0029 Coded/ Replicate No. —— Date 8 / 19 / 97

Weather Sunny 80's → 90's Purge Begin 1320 Purge Ended 1330 Time Collected 1330

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	±2.5	MP Elevation	
Total Sounded Depth of Well Below MP	30.85	Water-Level Elevation	
Depth of Water Below MP	20.55	Diameter of Casing	2"
Water Column in Well	10.30	Total Purge Volume	10
Gallons per Foot	0.16	Sampling Pump Intake	
Gallons in Well	1.65x5=8.25	(feet below MP)	25

30.85
-20.55
10.30
.16
6180
1030
1.6480
1.65
8.25

Evacuation Method 2" Submersible Pump

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor — Appearance — Temperature 29 °C

Specific Conductance (mmhos/cm) 0.63 pH 7.34 Dissolved Oxygen 1.1 mg/L

Turbidity 3.6 NTUs Eh mV 10 gal

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 12 of 26

Site Location Birmingham, Alabama Site/Well No. MW-30S

Sample I.D. 970821 -LD-38 -GW0030S Coded/ Replicate No. 970821-LD-38-GW0030S MS/MSD Date 8 / 21 / 97

Weather 80's Sunny Purge Begin 1315 Purge Ended 1325 Time Collected 1330

EVACUATION DATA

Description of Measuring Point (MP) TOC ±

Height of MP Above/Below Land Surface	±2.5	MP Elevation	
Total Sounded Depth of Well Below MP	37.5	Water-Level Elevation	
Depth of Water Below MP	21.10	Diameter of Casing	2"
Water Column in Well	16.40	Total Purge Volume	15
Gallons per Foot	0.16	Sampling Pump Intake (feet below MP)	30
Gallons in Well	2.6 x5 = 13		

3 2 16.40 .16 9840 1640 2.6240 3 2.6 5 13.0

Evacuation Method 2" submersible pump.

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor — Appearance — Temperature 22 °C

Specific Conductance (mmhos/cm) 0.51 pH 6.64 Dissolved Oxygen 4.4 mg/L

Turbidity 10.1 NTUs Eh ____ mV

Other

CONTAINER DESCRIPTION

Constituents Sampled — From Lab X or G&M ____ — Preservative

Constituents Sampled	Container	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number: Sloss Industries / TF0320.015 — Page 11 of 20

Site Location: Birmingham, Alabama — Site/Well No.: MW-30D

Sample I.D.: 970821 -LD-38 -GW0030D — Coded/ Replicate No.: — — Date: 8 / 21 / 97

Weather: 80's — Purge Begin: 1415 — Purge Ended: 1455 — Time Collected: 1500

EVACUATION DATA

Description of Measuring Point (MP): TOC

Height of MP Above/Below Land Surface	±2.5	MP Elevation	
Total Sounded Depth of Well Below MP	61.5	Water-Level Elevation	
Depth of Water Below MP	20.65	Diameter of Casing	2"
Water Column in Well	40.85	Total Purge Volume	35
Gallons per Foot	0.16	Sampling Pump Intake (feet below MP)	55
Gallons in Well	6.5 x 5 = 32.5		

61.50
20.65
40.85
.16
24510
40850

6.5360
6.5
5
32.5

Evacuation Method: 2" submersible pump

SAMPLING DATA/FIELD PARAMETERS

Color: Clear — Odor: — — Appearance: — — Temperature: 21 °C

Specific Conductance (mmhos/cm): 0.55 — pH: 7.08 — Dissolved Oxygen: 2.1 mg/L

Turbidity: 6.2 NTUs — Eh: ____ mV

Other: ____

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks: ____

Sampling Personnel: Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 13 of 20

Site Location Birmingham, Alabama Site/Well No. MW-31

Sample I.D. 970821 -LD- 39 -GW0031 Coded/ Replicate No. — Date 8 / 21 / 97

Weather Sunny 80's Purge Begin 945 Purge Ended 1025 Time Collected 1030

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	±2.5	MP Elevation	
Total Sounded Depth of Well Below MP	49.27	Water-Level Elevation	
Depth of Water Below MP	20.70	Diameter of Casing	2"
Water Column in Well	28.57	Total Purge Volume	25
Gallons per Foot	0.16	Sampling Pump Intake (feet below MP)	
Gallons in Well	4.6 x 5 = 23		

Evacuation Method 2" Submersible Pump

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor — Appearance Sl. Turbid Temperature 23 °C

Specific Conductance (mmhos/cm) 0.43 pH ~~7.21~~ 6.64 Dissolved Oxygen 1.9 mg/L

Turbidity 136.4 NTUs Eh ____ mV

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M ___	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 14 of 20

Site Location Birmingham, Alabama Site/Well No. MW-32

Sample I.D. 970821 -LD-39 -GW 0032 Coded/ Replicate No. — Date 8 / 21 / 97

Weather Sunny 80's Purge Begin 1105 Purge Ended 1140 Time Collected 1145

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface +2.5 MP Elevation

Total Sounded Depth of Well Below MP 49.9 Water-Level Elevation

Depth of Water Below MP 16.80 Diameter of Casing 2"

Water Column in Well 33.10 Total Purge Volume 30

Gallons per Foot 0.16 Sampling Pump Intake

Gallons in Well 5.3×5 = 26.5 (feet below MP) 25

33.10
.16
19860
33100
5.2960

5.3
5
26.5

Evacuation Method

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor — Appearance Clear Temperature 24 °C

Specific Conductance (mmhos/cm) 0.45 pH 6.63 Dissolved Oxygen 3.7 mg/L

Turbidity 9.2 NTUs Eh mV

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 15 of 20

Site Location Birmingham, Alabama Site/Well No. MW-33

Sample I.D. 970820 -LD- 39 -GW0037 Coded/ Replicate No. Date 8 / 20 / 97

Weather Sunny 80's Purge Begin 1650 Purge Ended 1715 Time Collected 1720

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	±2.5	MP Elevation	
Total Sounded Depth of Well Below MP	41.40	Water-Level Elevation	
Depth of Water Below MP	8.15	Diameter of Casing	2"
Water Column in Well	33.25	Total Purge Volume	30
Gallons per Foot	0.16	Sampling Pump Intake	
Gallons in Well	5.33 x5 = 27 Gal	(feet below MP)	15

41.40
8.15
33.25
.16
5.3300
5
26.65

Evacuation Method 2" Submersible Pump

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor — Appearance — Temperature 22 °C

Specific Conductance (mmhos/cm) 1.14 pH 6.40 Dissolved Oxygen 2.8 mg/L

Turbidity 0.80 NTUs Eh mV

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 16 of 20

Site Location Birmingham, Alabama Site/Well No. MW-34S

Sample I.D. 970820 -LD- 39 -GW00345 Coded/ Replicate No. GUARDIAN SPLIT 970820-LD-39-GW90345 Date 8 / 20 / 97

Weather Overcast 80's occasional light rain Purge Begin 1200 Purge Ended 1225 Time Collected 1230

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	±2.5	MP Elevation	
Total Sounded Depth of Well Below MP	36.4	Water-Level Elevation	
Depth of Water Below MP	6.35	Diameter of Casing	2"
Water Column in Well	30.05	Total Purge Volume	25
Gallons per Foot	0.16	Sampling Pump Intake	
Gallons in Well	4.8 x 5 = 23	(feet below MP)	

36.40
6.35
30.05
.16
18030
30050
4.8085

3 4.8
5
23.0

Evacuation Method 2" submersible pump

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor — Appearance — Temperature 21 °C

Specific Conductance (mmhos/cm) 1.49 pH 6.55 Dissolved Oxygen 1.2 mg/L

Turbidity 8.85 NTUs Eh ____ mV

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M ____	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks 970820-LD-39-EB0004 & 970820-LD-39-EB0004, 970820-LD-39-FB0005, 970820-LD-39-EB0005 Guardian

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 17 of 20

Site Location Birmingham, Alabama Site/Well No. MW-39D

Sample I.D. 970824 -LD- 39 -GW0039D Coded/ Replicate No. — Date 8 / 24 / 97

Weather PURGED & SAMPLED OVER 2 DAYS Purge Begin 8/20/97 1400 Purge Ended — Time Collected 1715

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	± 2.5	MP Elevation	
Total Sounded Depth of Well Below MP	182	Water-Level Elevation	
Depth of Water Below MP	5.65	Diameter of Casing	2"
Water Column in Well	174.35	Total Purge Volume	32
Gallons per Foot	0.16	Sampling Pump Intake	
Gallons in Well	27.9 x 5 = 140	(feet below MP)	

182.00 5.65 174.35 .16 10460 17435 0 27896 0 28 5 140

Evacuation Method 2" SUBMERSIBLE PUMP

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor — Appearance STURBID Temperature 22 / 23 °C

Specific Conductance (mmhos/cm) 1.15 | 1.16 pH 9.28 | 8.47 Dissolved Oxygen 1.0 | 2.2 mg/L

Turbidity 5.2 | >200 NTUs Eh ___ mV 30gal | 32

Other

DTW 30GAL 176.1 |

CONTAINER DESCRIPTION

Constituents Sampled — From Lab X or G&M ___ — Preservative

Constituents Sampled	Container	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 18 of 20

Site Location Birmingham, Alabama Site/Well No. MW-35

Sample I.D. 970821 -LD- 39 -GW0035 Coded/ Replicate No. — Date 8 / 21 / 97

Weather 80's Purge Begin NA Purge Ended NA Time Collected 1530

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	±2.5	MP Elevation	
Total Sounded Depth of Well Below MP		Water-Level Elevation	
Depth of Water Below MP		Diameter of Casing	
Water Column in Well		Total Purge Volume	
Gallons per Foot		Sampling Pump Intake	
Gallons in Well		(feet below MP)	

Evacuation Method BAILED DRY 5 TIMES ALLOWED TO RECHARGE FROM 8/20/97

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor — Appearance — Temperature 22 °C

Specific Conductance (~~u~~mmhos/cm) 1.69 pH 7.47 Dissolved Oxygen C.O mg/L

Turbidity 5.7 NTUs Eh mV

Other

CONTAINER DESCRIPTION

Constituents Sampled From Lab X or G&M Preservative

Constituents Sampled	Container	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 19 of 20

Site Location Birmingham, Alabama Site/Well No. MW-36

Sample I.D. 970821 -LD- 39 -GW0036 Coded/ Replicate No. — Date 8 / 21 / 97

Weather PURGED & SAMPLED OVER 2 DAYS Purge Begin 900 8/20/97 Purge Ended 1225 Time Collected 1240

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	+2.5	MP Elevation	
Total Sounded Depth of Well Below MP	139	Water-Level Elevation	
Depth of Water Below MP	0	Diameter of Casing	2"
Water Column in Well	135	Total Purge Volume	75
Gallons per Foot	0.16	Sampling Pump Intake	
Gallons in Well	22.24 x 5 = 112	(feet below MP)	

139 × .16 = 834 / 139 = 22.24; 22.24 × 5 = 11.20

Evacuation Method NATURAL PURGE - ARTESIAN WELL

SAMPLING DATA/FIELD PARAMETERS

Color CLEAR Odor SULFUR Appearance — Temperature 22 / 22 / 22 °C

Specific Conductance (umhos/cm) 0.99 / 1.01 / 1.01 m pH 9.17 / 9.15 / 9.16 Dissolved Oxygen 1.7 / 1.6 / 1.2 mg/L

Turbidity 3.2 / 1.5 / 2.4 NTUs Eh _____ mV 20 GAL / 30 GAL

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

proj\tf320\wslog1.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

WATER SAMPLING LOG

Project Name/Number Sloss Industries / TF0320.015 Page 20 of 20

Site Location Birmingham, Alabama Site/Well No. MW-37

Sample I.D. 970821 -LD- 38 -GW 0037 Coded/ Replicate No. — Date 8 / 21 / 97

Weather 80's Purge Begin 850 Purge Ended 905 Time Collected 910

EVACUATION DATA

Description of Measuring Point (MP) TOC

Height of MP Above/Below Land Surface	±2.5	MP Elevation	
Total Sounded Depth of Well Below MP	30.20	Water-Level Elevation	
Depth of Water Below MP	3.80	Diameter of Casing	2"
Water Column in Well	26.40	Total Purge Volume	22
Gallons per Foot	0.16	Sampling Pump Intake	
Gallons in Well	4.2 x5 = 21.0	(feet below MP)	

30.20 3.80 26.40 .16 15840 2640 4.2240 4.2 5 21.0

Evacuation Method 2" Submersible Pump

SAMPLING DATA/FIELD PARAMETERS

Color Clear Odor — Appearance — Temperature 26 °C

Specific Conductance (mmhos/cm) .51 pH 6.97 Dissolved Oxygen 1.5 mg/L

Turbidity 4.7 NTUs Eh mV

Other

CONTAINER DESCRIPTION

Constituents Sampled	From Lab X or G&M	Preservative
VOCs (8260)	3 40-ml vials	HCL
SVOCs (8270)	2 1-liter amber glass	None
Cyanide (9010)	1 1-quart, plastic	NaOH
Priority Pollutant Metals & Barium (6010)	500 ml plastic	HNO3
Mercury (7470)	500 ml glass	HNO3

Remarks

Sampling Personnel Joe Hughes, David Page

WELL CASING VOLUMES

GAL./FT.				
	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

VOLUME I

APPENDIX B

GEOPHYSICAL INVESTIGATION REPORT

CONTENTS

FIGURES

GEOPHYSICAL SURVEY AT SLOSS INDUSTRIES
BIRMINGHAM, ALABAMA

INTRODUCTION

Geophysical surveys were required around Solid Waste Management Units (SWMU) at SLOSS Industries facility in Birmingham, Alabama. These surveys satisfy some of the requirements of an RIFS at this site. The surveys were a continuation of earlier surveys conducted in 1996, when seismic refraction data was recorded around the SWMU's.

The data was recorded during the time period July 7 to July 14, 1997.

Conductivity and resistivity surveys were run round SWMU 23 and SWMU 38/39. These were designed to see if conductive landfill material had migrated away from the landfills, probably as a leachate moving in the groundwater under and around the landfills.

GEOLOGY / PHYSICS

Many contaminants increase the electrical conductivity of water. This occurs either because the contaminant itself is electrically conductive, or more commonly because a suite of fluids moves with the contaminant, components of which are electrically conductive. Probably the most common substances which increase the electrical conductivity of water are salts of various kinds. When these flow from the ground surface through the unsaturated zone to the saturated zone they first increase the conductivity of the unsaturated zone. Once they reach the groundwater they then increase its electrical conductivity.

The electrical conductivity of soils and rocks depends mostly on the porosity of these materials, the conductivity of the saturating water and the degree of saturation of the pores. However, another factor to be considered is the amount of clay present. Clays are very fine grained material and often have free electrical charges on the grain surfaces. These charges contribute to the electrical conductivity and result in the conductivity of clay materials being higher than can be accounted for by considering porosity and saturating water conductivity.

At the Sloss site five to twenty feet of soil covers a limestone bedrock. The limestone is steeply dipping and forms a somewhat erratic bedrock surface. In situ weathering of the bedrock has resulted in the formation of lenses of clay.

Geophysical surveys were conducted around two main Solid Waste Management Units (SWMU) at the site. These landfills contain industrial waste including fly ash which contains metals. It is suspected that this material may be electrically conductive. The geophysical surveys were designed to measure the electrical conductivity of the ground and to locate any anomalous areas of unusually high conductivity.

It is expected that the electrical conductivity of the ground at Sloss can be broadly divided into the overburden conductivity and the bedrock conductivity. Although the water table is generally well below the bedrock surface there are areas of saturation within the limestone above the water table. It is expected that the limestone bedrock will generally have a lower conductivity than the overburden. This is because, apart from fractured regions, limestone is generally a low porosity rock. In regions where the limestone is fractured and saturated its conductivity will be increased. Contamination from the SWMU 's, if it occurs, may have drained vertically into the ground until reaching a saturated zone within the limestone. It would then move along with the groundwater movement, which is generally to the north. In addition, during heavy rains, contamination may drain from the SWMU's onto the local ground surface and then infiltrate the soil and bedrock. The geophysical surveys are primarily designed to locate areas of high conductivity associated with contaminants in the bedrock.

Because of the higher expected conductivity of the overburden, and the variable nature of the overburden thickness, surveys were performed to map the ground conductivity to different depths. This better allows an interpretation of the conductivity of the overburden and the bedrock.

GEOPHYSICAL MEASUREMENTS

The electrical conductivity of the ground can be measured using several different methods. Two methods were used on this survey broadly called Terrain Conductivity and Ground Resistivity. Terrain Conductivity was measured using two instruments, one called an EM31 and the other an EM34. The EM31 can measure Terrain Conductivity at two depths, 10 and about 18 feet. At this site the EM31 was used to measure conductivities to 18 feet depth. The EM34 can also be used in different modes to give different depths. At this site the instrument was used with a coil separation of 20 meters and in the horizontal dipole mode. In this configuration the instrument has a depth of investigation of about 50 feet. Both instruments essentially measure the bulk electrical conductivity of the ground down to the depth of investigation of that instrument.

In addition, Ground Resistivity measurements were also taken. These measure the resistivity (reciprocal of conductivity) of the ground. Ground Resistivity measurements were taken using four electrodes (12 inch nails) placed into the ground a few inches. The electrodes are in a straight line with the two inner electrodes being placed close together (a few feet) and the two outer electrodes being either 20 feet or 100 feet from the center of the "array". This particular electrode array used to obtain the resistivity measurements is called the Schlumberger array. A small electrical current is passed through the outer electrodes which then penetrates the ground. The voltage developed by this current is then measured across the two inner electrodes. Simple calculations using the electrode array geometry along with the current and measured voltage give the resistivity of the ground. The depth of investigation of the Schlumberger array depends on the resistivity structure of the ground but is generally somewhat less than the distance from the center of the electrode array to one of the outer electrodes.

The EM31 and EM34 instruments use electromagnetic waves to measure the conductivity of the ground. These waves are generated in a coil through which oscillating electrical current flows. The electromagnetic field surrounds the coil and interacts with any conductive material in the vicinity of the coil. At the Sloss site there were above ground pipes at some locations and railroad lines and cars along the north western side of SWMU 38/39. It was suspected that these cars in particular would influence the conductivity readings. This would be particularly true with the EM34 system which penetrates to a greater depth than the EM31 and has a larger sphere of influence. However, with Grounded Resistivity measurements the electrical current is injected directly into the ground. Very little electrical current is present in the atmosphere above the ground and the above ground railroad cars have little influence on the data.

GEOPHYSICAL RESULTS

SWMU 23

SWMU 23 is at the north end of the Sloss site and is at a higher elevation than SWMU 38/39. No "cultural" features are close to the landfill which would interfere with the EM31 or EM34 instruments. Data was recorded with the EM31 at stations spaced 5 feet apart around the landfill. Additionally, data was recorded with the EM34 configured to have a depth of investigation of about 50 feet. EM34 readings were taken every 25 feet. The EM31 data is presented on figure 1. The EM34 data is presented on figure 2. Both of these plots show the conductivity data presented as a colored ribbon around the path taken during data recording. The numbers along this path are the field flag numbers used to locate the traverse. These have been surveyed and are used to locate and present the data at its proper location. These flags are 50 feet apart. The color bar at the side of the data shows the conductivity values associated with each of the traverses. Both the EM31 and EM34 data sets are also presented on Figure 3 in order to compare directly the deep and shallow data. On the EM31 data three anomalies are seen and are labeled A, B and C on figure 1. Figure 2 shows anomalies A and D seen by the deeper looking EM34. Figure 3 shows that anomaly A is clearly observed on both data sets. Anomalies C (EM31) and D(EM34) are each quite complex anomalies and generally occur over the same region but with different locations for their maximum values.

Anomaly B is seen mostly on the EM31 data. The EM34 data shows only a low amplitude anomaly at this site. Therefore this anomaly probably reflects overburden thickness variations rather than conductive material in the bedrock. The region about anomaly A is topographically higher than the SWMU, which appears to be in a small depression in the hillside. Since Anomaly A is visible in the shallow data (EM31), and, because it is topographically higher than the SWMU, it is unlikely to result from contamination from the SWMU. It seems likely therefore that this higher conductivity zone is caused by clay.

As discussed above, anomalies C and D are essentially complex anomalies in the same region and are therefore considered as one anomaly. Thus the area has increased conductivity both at shallow and deeper levels. This area is generally a small valley and is topographically lower than the SWMU. It is possible that these anomalies result from liquids flowing down the valley from the SWMU and infiltrating into the bedrock. However, it should be noted that the maximum conductivity at this location is only about 30 millimho/m which is not a high value. Moreover, the average shallow conductivity is less than 20 millimho/m and the average deep conductivity is less than 15 millimho/m.

SWMU 38/39

It was initially planned to conduct EM31 and EM34 around most of this landfill Resistivity was planned for only a small section along the north western side of the landfill near the rail road tracks. However an overhead pipeline was present along the south eastern part of the SWMU and a buried gas pipeline was present along the northern part of the south eastern side of the landfill. The approximate locations of these pipelines are shown on figures 1 and 2. Because of the overhead pipeline and the railroad tracks and cars it was decided to conduct Grounded Resistivity readings around the landfill instead of the EM34 measurements. Since the radius of influence of the EM31 is only about 20 feet it was felt that the overhead pipeline would not significantly interfere with this data. Only the railroad cars may be a problem for the EM31. Because of this a shallower Grounded Resistivity survey was also conducted along the railroad tracks.

In order to determine the vertical succession of resistivity two Schlumberger soundings were conducted. The locations for the two soundings are shown on figures 1 and 2 as locations S1 and S2. The sounding data is presented as figures 6 and 7. The data is presented as a graph showing the measured resistivity (usually called Apparent resistivity) against the half current electrode spacing. This data has been interpreted to provide the variation of resistivity with depth. The interpretation of each sounding is presented on the upper right hand side of each sounding plot.

Sounding S1 shows a resistive layer, interpreted to be limestone bedrock, at a depth of 9.5 feet. The overburden is more conductive than the bedrock as was expected. Soundings S2 shows bedrock to be somewhat deeper at 21 feet. The limestone bedrock here is less conductive than that at S1 indicating a more competent and less fractured rock. The soundings also show that an electrode spacing of 100 feet penetrates well into the bedrock. A spacing of 20 feet barely reaches the bedrock and provides data mostly influenced by the overburden.

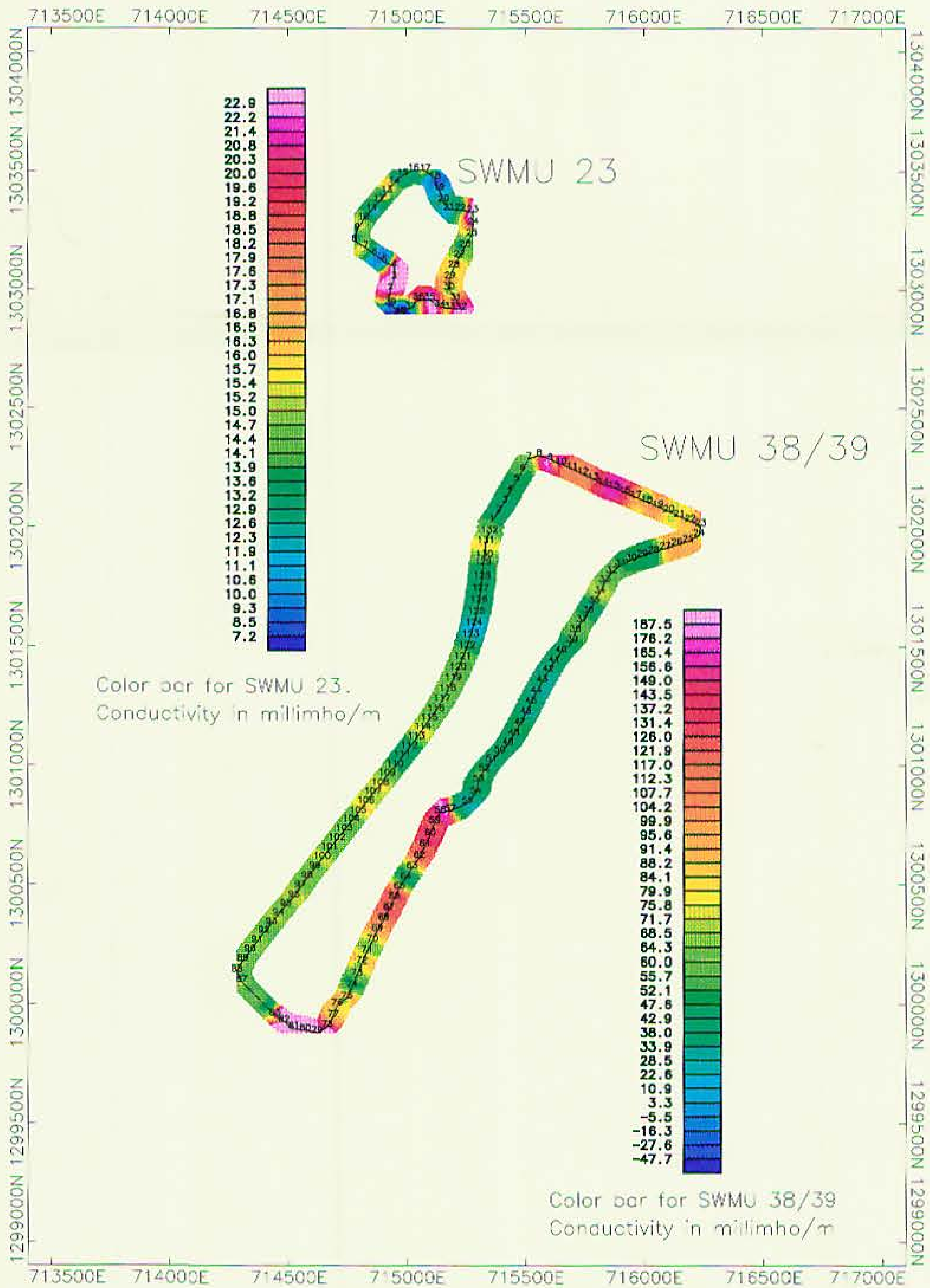
The EM31 data around SWMU 38/39 is presented on figure 1. The resistivity data around SWMU 38/39 is presented on figure 2. Figure 2 shows the resistivity data around the landfill as a colored ribbon representing the conductivity values obtained. The field flag numbers are also presented. Figure 4 presents both the resistivity and EM31 data. The EM31 data shows four areas of higher conductivity. These are shown on figure 1 and are labeled E, F, G and H. The resistivity data, shown on figure 2, shows only anomalies E, F and H. A comparison of the resistivity and EM31 data on figure 4 shows that anomaly G is not seen on the resistivity plot indicating no bedrock anomaly. Thus only anomalies E, F and

H are considered. Anomaly H crosses an area where material from the landfill appears to have spread out and may lie under the traverse location. If this landfill material is conductive, as is suspected, then this anomaly results from this conductive material. This interpretation is supported by the fact that only a low amplitude anomaly seen on the deeper resistivity data at this location. Anomalies E and F are essentially part of a broader region of higher conductivity along the northern edge of the landfill. This is along a roadside. Comparing the EM31 and resistivity data on figure 4 shows that the anomaly is most prevalent on the EM31 data and less so on the resistivity data. Therefore the conductivity anomaly is less pronounced at depth. It is possible that this anomaly results from a clay layer or thicker overburden at this location.

Along the north western side of SWMU 38/39 run several rail road tracks on which were parked a line of rail road cars. It was thought that these cars would influence the EM31 data. If this was the case then the shallow conductivity data along this side of the landfill would not provide a good indication of the overburden conductivity. Therefore a resistivity traverse was conducted along this side of the SWMU using a 20 foot electrode spacing. This electrode spacing provides a similar depth of investigation to that of the EM31. The data is plotted as a colored ribbon on figure 2, offset 100 feet to the west of its correct position. Figure 5 presents this data, converted to conductivity, along with the conductivity data recorded with an electrode spacing of 100 feet. As can be seen from this graph, variations in the shallow conductivity are between 20 and 50 millimho/m which is not a particularly wide range. In addition, no particular anomaly stands out. The deeper conductivity values show even less variation and again present no large anomalies.

CONCLUSIONS

Terrain Conductivity and Ground Resistivity data have been acquired around SWMU 23 and SWMU 38/39 at the Sloss site in Birmingham, Alabama. The surveys show several anomalies labeled A through H. However, anomalies B, G and H all appear to be caused by fairly shallow features and are not considered bedrock anomalies. Anomaly A on SWMU 23 is topographically higher than the SWMU and therefore it seems unlikely that it results from contamination from the SWMU. This anomaly is interpreted as resulting from clay at this location. Anomalies E and F are part of a broad complex anomaly at the north end of SWMU 38/39. Although fairly high conductivity values are seen on the EM31 data much lower values occur on the resistivity data. This anomaly could therefore result from clay or deeper overburden. Finally anomalies C and D (SWMU 23) are part of a complex anomaly at this location. The anomaly is seen in the shallow and deep results although the amplitudes are not particularly high. This data suggests that conductivity is increased in the bedrock at this location.



EM31 Conductivity Data

EM31 data recorded around SWMU 23 and 38/39. Data recorded in vertical dipole mode with readings taken every 5 feet. EM31 boom kept parallel to direction of travel.

Field flags placed around each SWMU. Consecutive flags are 50 feet apart.

.... EM31 data points around each SWMU.

N

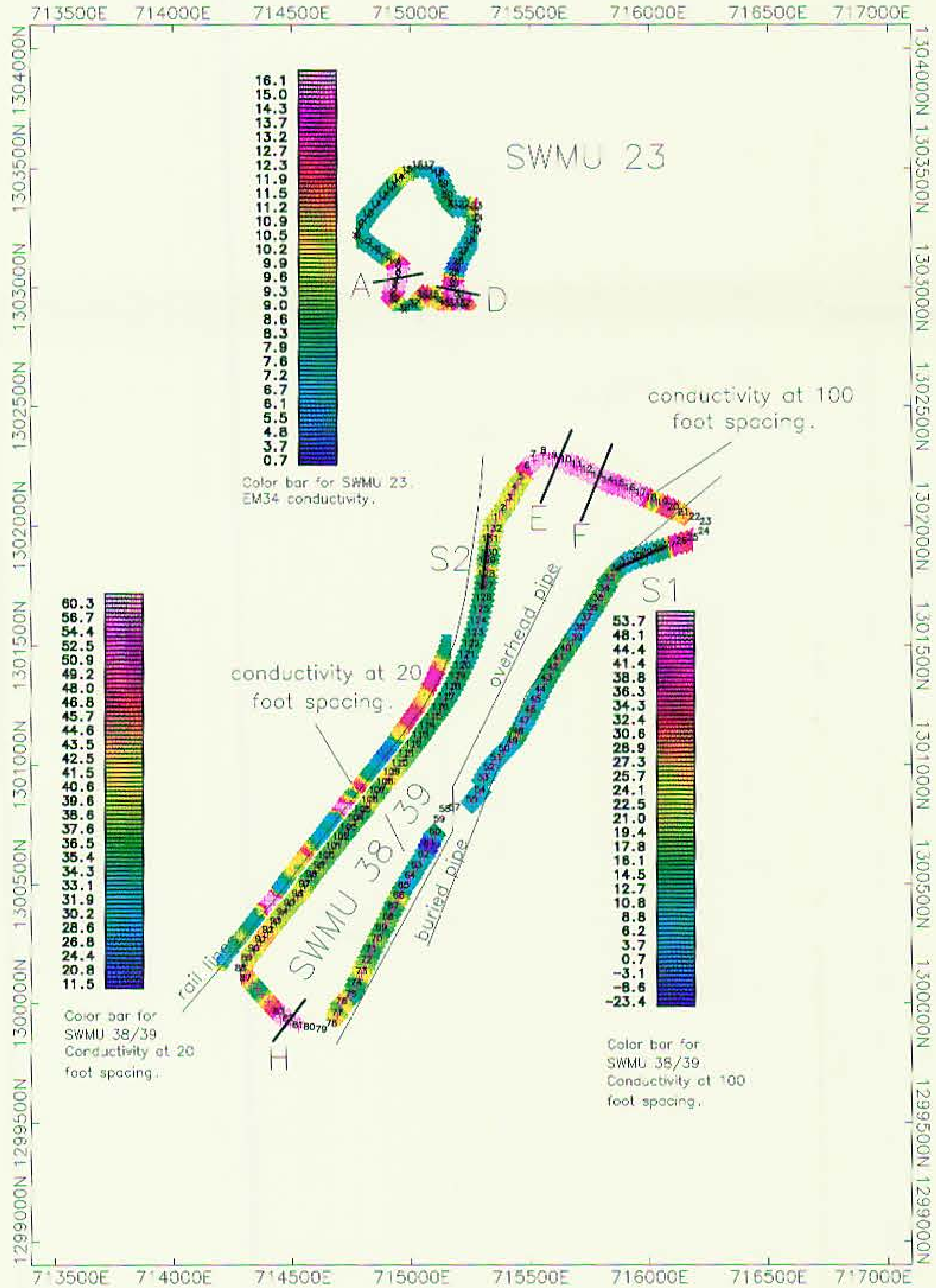
Scale 1:6000

250 0 250 500 750 1000 1250

(feet)

FIGURE 1

SLOSS INDUSTRIES CORPORATION
Conductivity and Resistivity Surveys Site at Birmingham, Alabama
EM31 conductivity data, SWMU 23 and 38/39
Geraghty & Miller, Inc. Geophysics Group



Scale 1:6000

250 0 250 500 750 1000 1250

(feet)

EM34 and Resistivity Data

EM34 conductivity data for SWMU 23 is plotted along with Resistivity data for SWMU 38/39.

In order to maintain consistency of the data units, the resistivity data has been converted to conductivity values. Conductivity is the reciprocal of resistivity. On the plot region of this map, all data is referred to as conductivity data.

Resistivity data for SWMU 38/39 was recorded at two electrode spacings. Data at 100 foot spacing was recorded all around the landfills. Data at 20 foot spacing was recorded only along the north western border of the landfill. The resistivity values at 20 foot spacing are shown offset 100 feet to the west of their proper location.

+ Data point. Resistivity, 20 ft. spacing.

\+ Data point. Resistivity, 100 ft. spacing.

× EM34 data point.

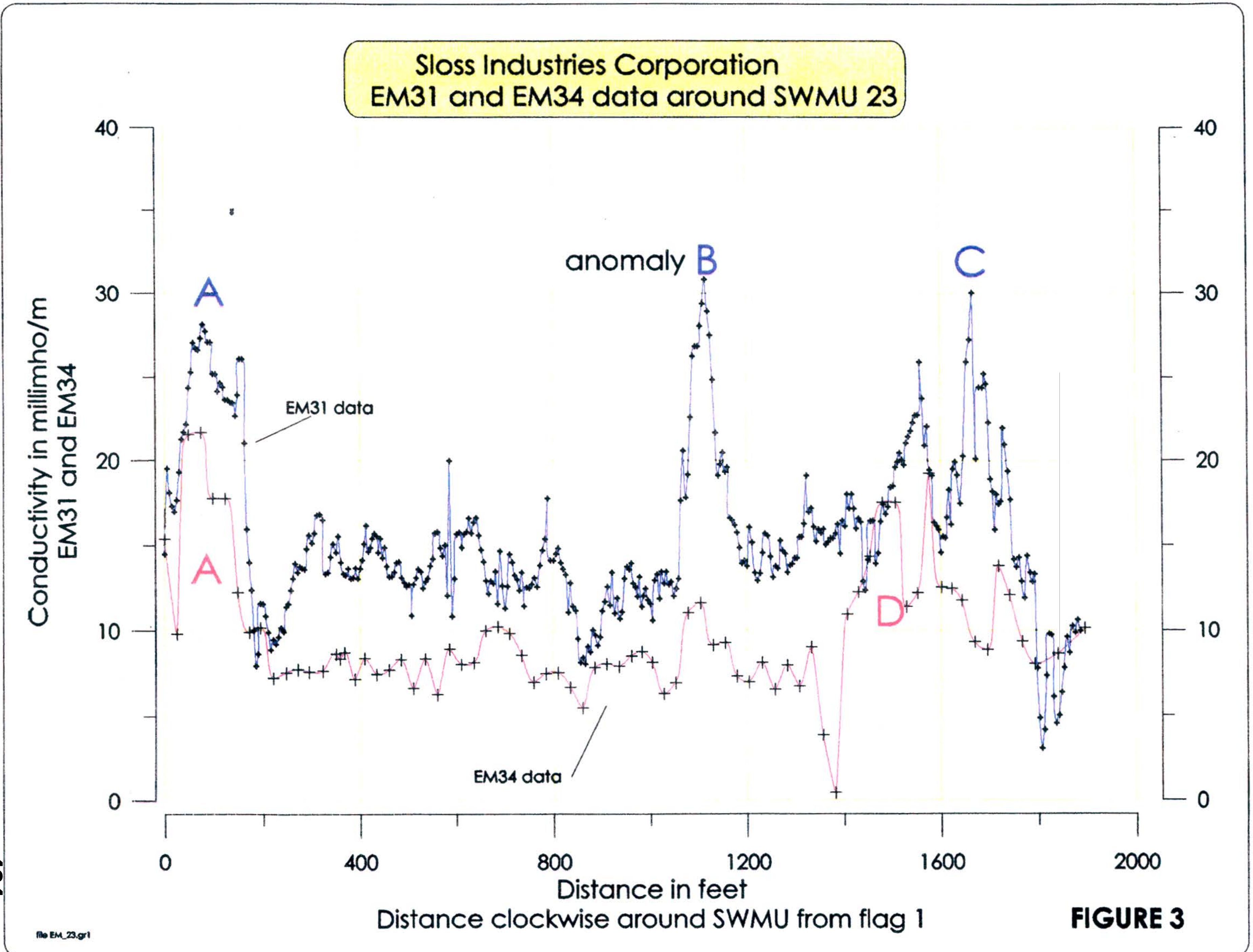
12 Field flags. These are placed around each SWMU. Consecutive field flags are 50 feet apart.

—— B Anomalies

S1 Schlumberger sounding

FIGURE 2

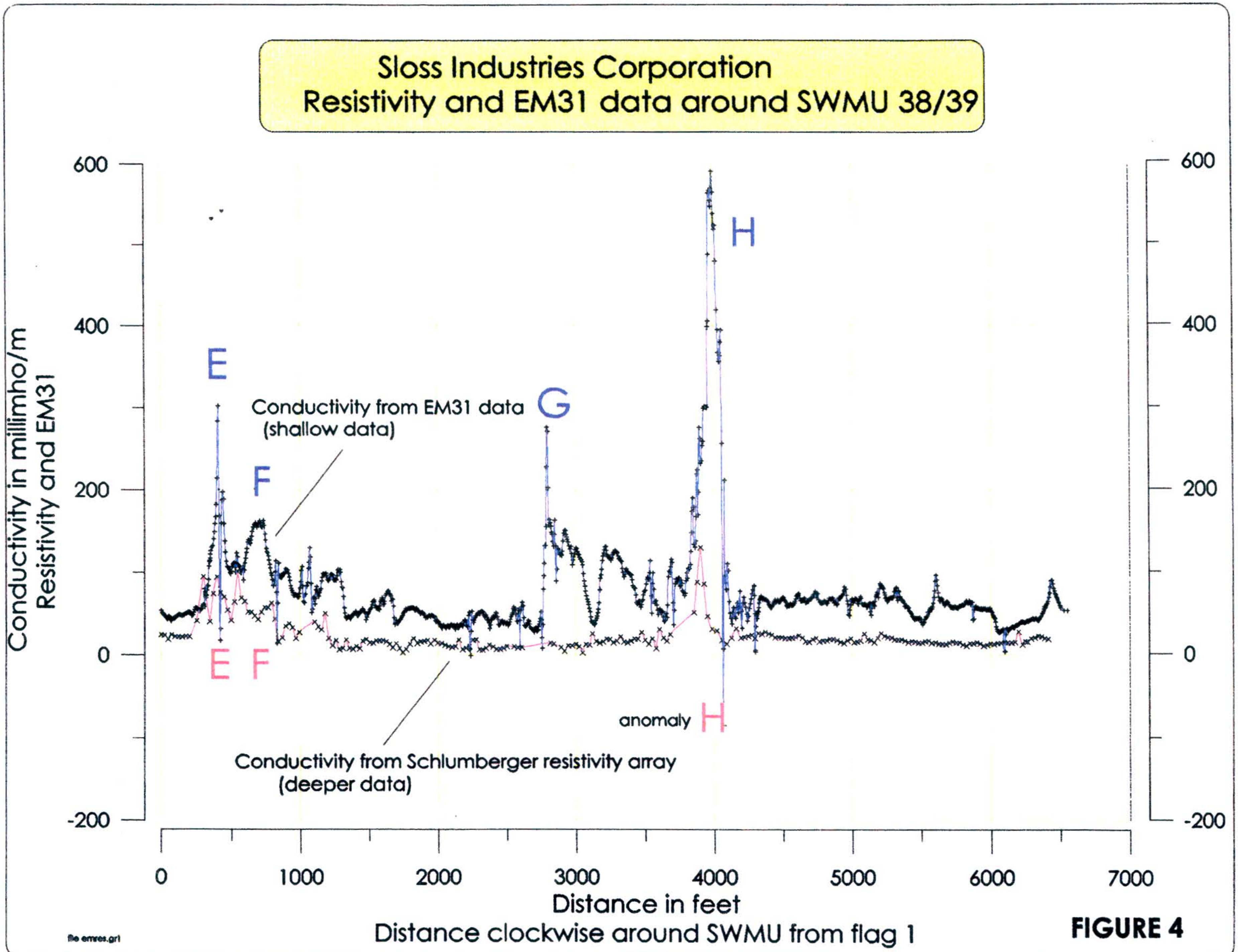
SLOSS INDUSTRIES CORPORATION
Conductivity and Resistivity Surveys Site at Birmingham, Alabama
EM34 and Resistivity Data, SWMU 23 and 38/39.
Geraghty & Miller, Inc. Geophysics Group



Sloss Industries Corporation
EM31 and EM34 data around SWMU 23
Conductivity in millimho/m
EM31 and EM34
40
30
20
10
0
anomaly B
A
A
C
D
EM31 data
EM34 data
0
400
800
1200
1600
2000
Distance in feet
Distance clockwise around SWMU from flag 1
file EM_23.grf

FIGURE 3

464



Sloss Industries Corporation
Resistivity and EM31 data around SWMU 38/39
Conductivity in millimho/m
Resistivity and EM31
600
400
200
0
-200
E
F
G
H
E F
anomaly H
Conductivity from EM31 data
(shallow data)
Conductivity from Schlumberger resistivity array
(deeper data)
0
1000
2000
3000
4000
5000
6000
7000
Distance in feet
Distance clockwise around SWMU from flag 1
file emres.grf

FIGURE 4

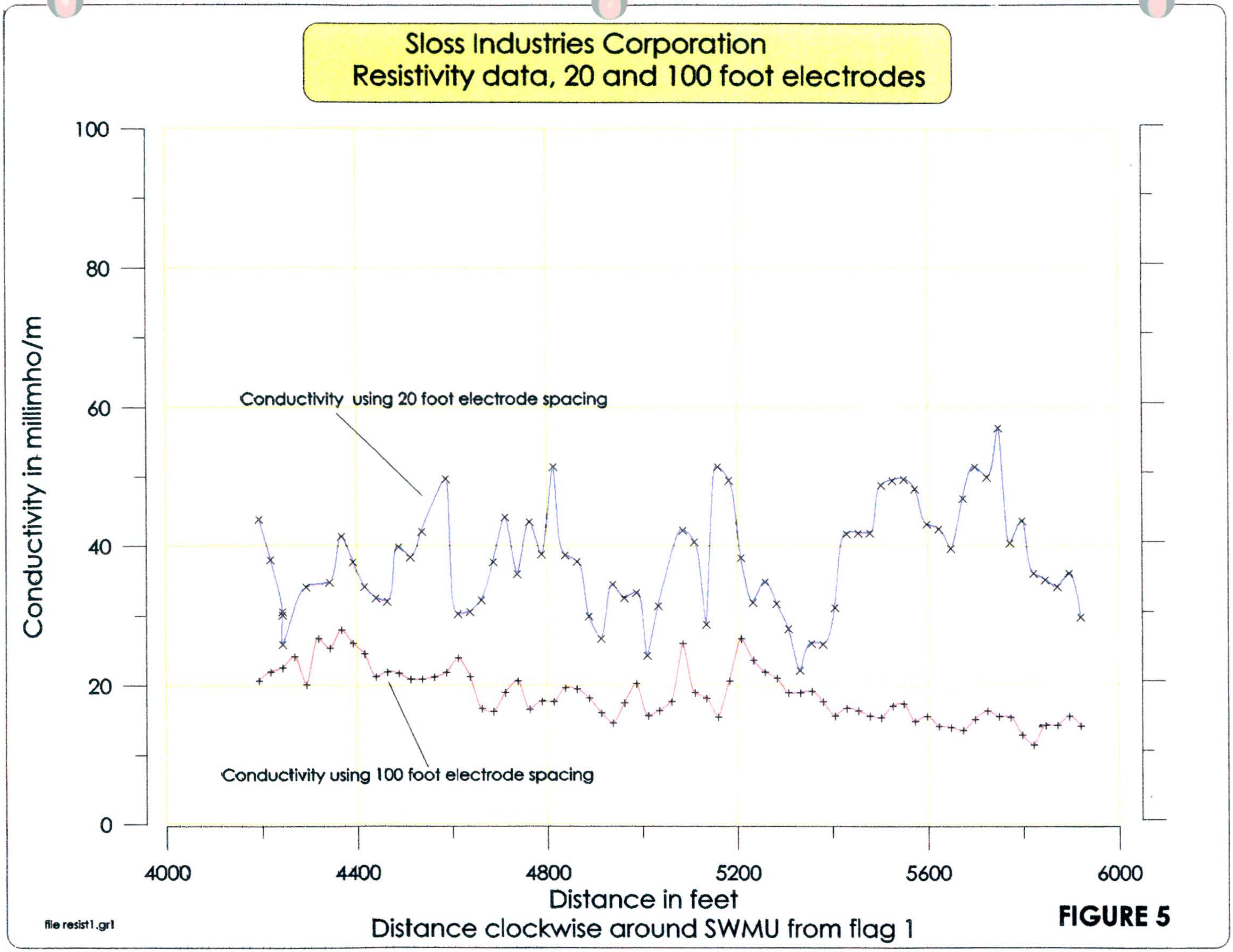

Sloss Industries Corporation
Resistivity data, 20 and 100 foot electrodes
100
80
60
40
20
0
Conductivity in millimho/m
Conductivity using 20 foot electrode spacing
Conductivity using 100 foot electrode spacing
4000
4400
4800
5200
5600
6000
Distance in feet
Distance clockwise around SWMU from flag 1
file resist1.grl

FIGURE 5

SCHLUMBERGER SOUNDING

Recorded at field flag 28, SWMU 38/39

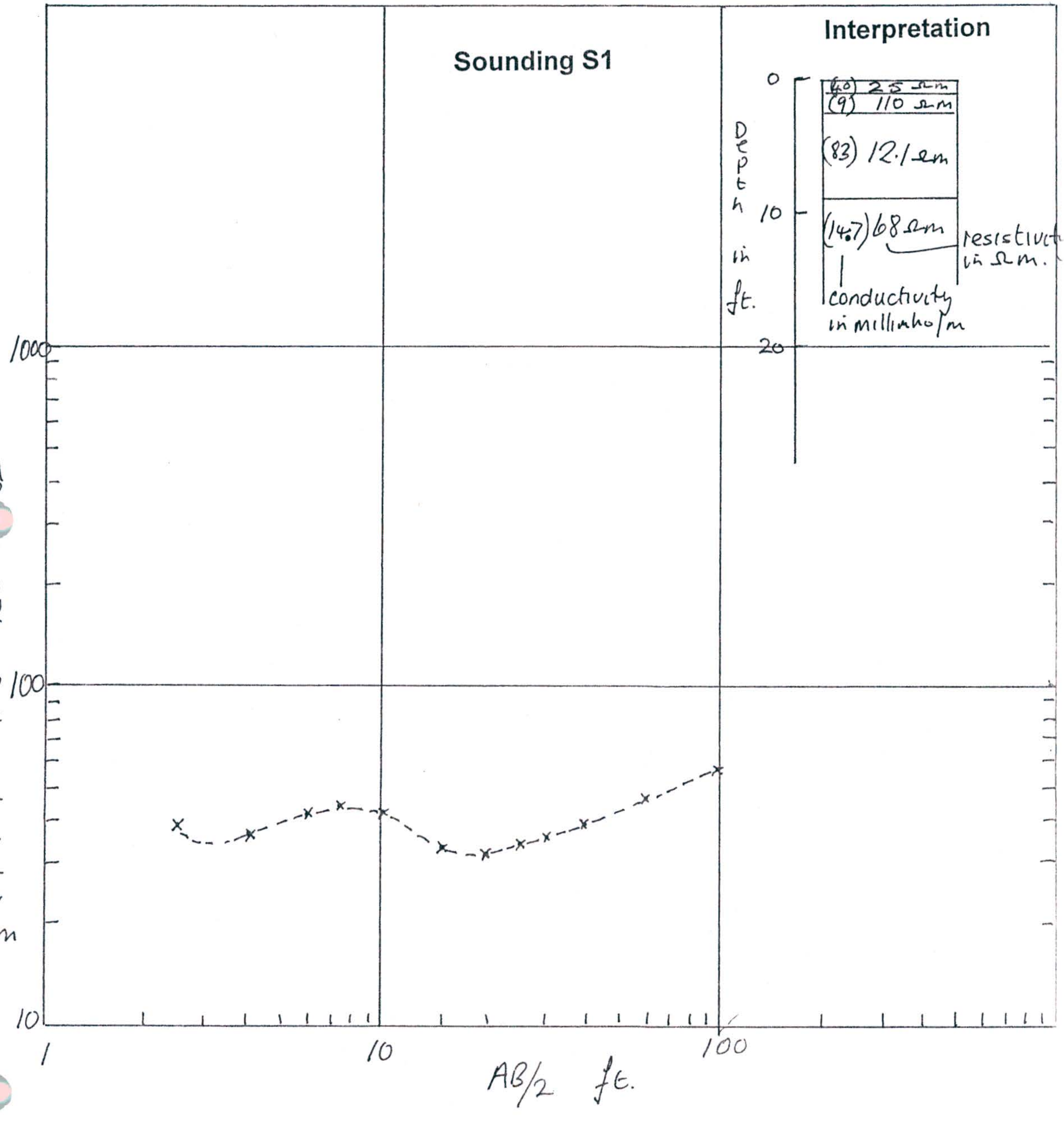


Figure 6

SCHLUMBERGER SOUNDING

Recorded at field flag 127, SWMU 38/39

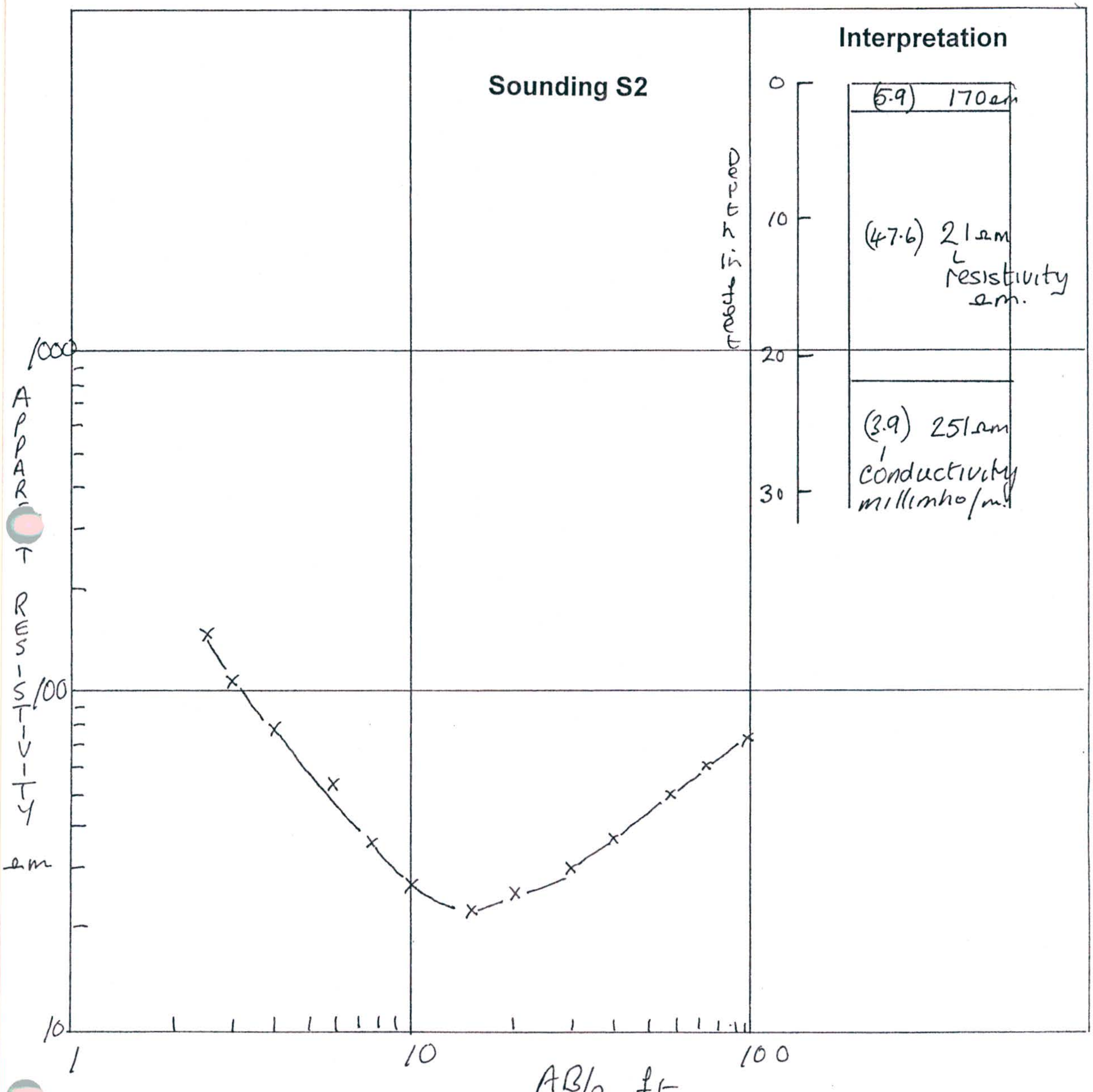
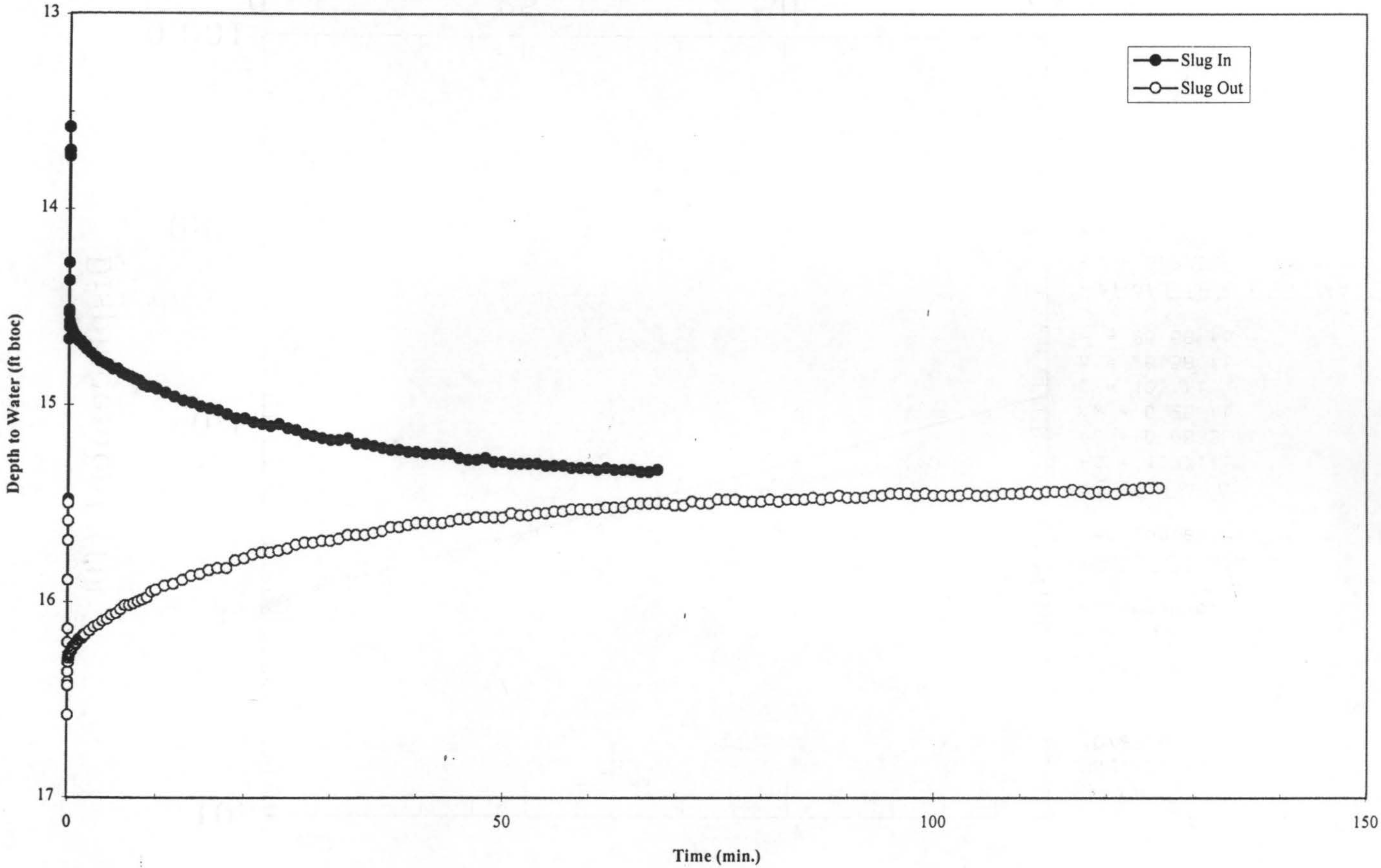
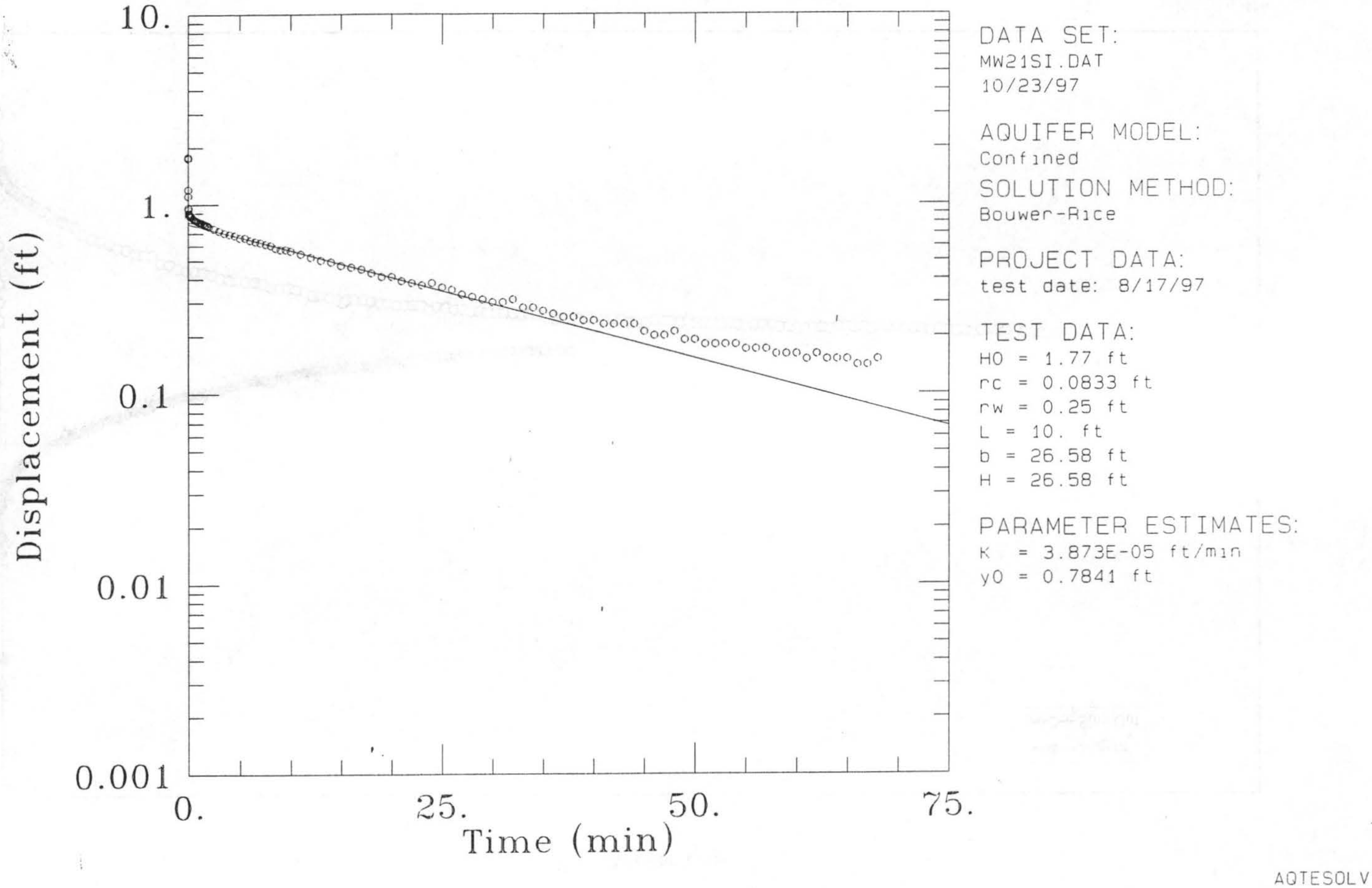
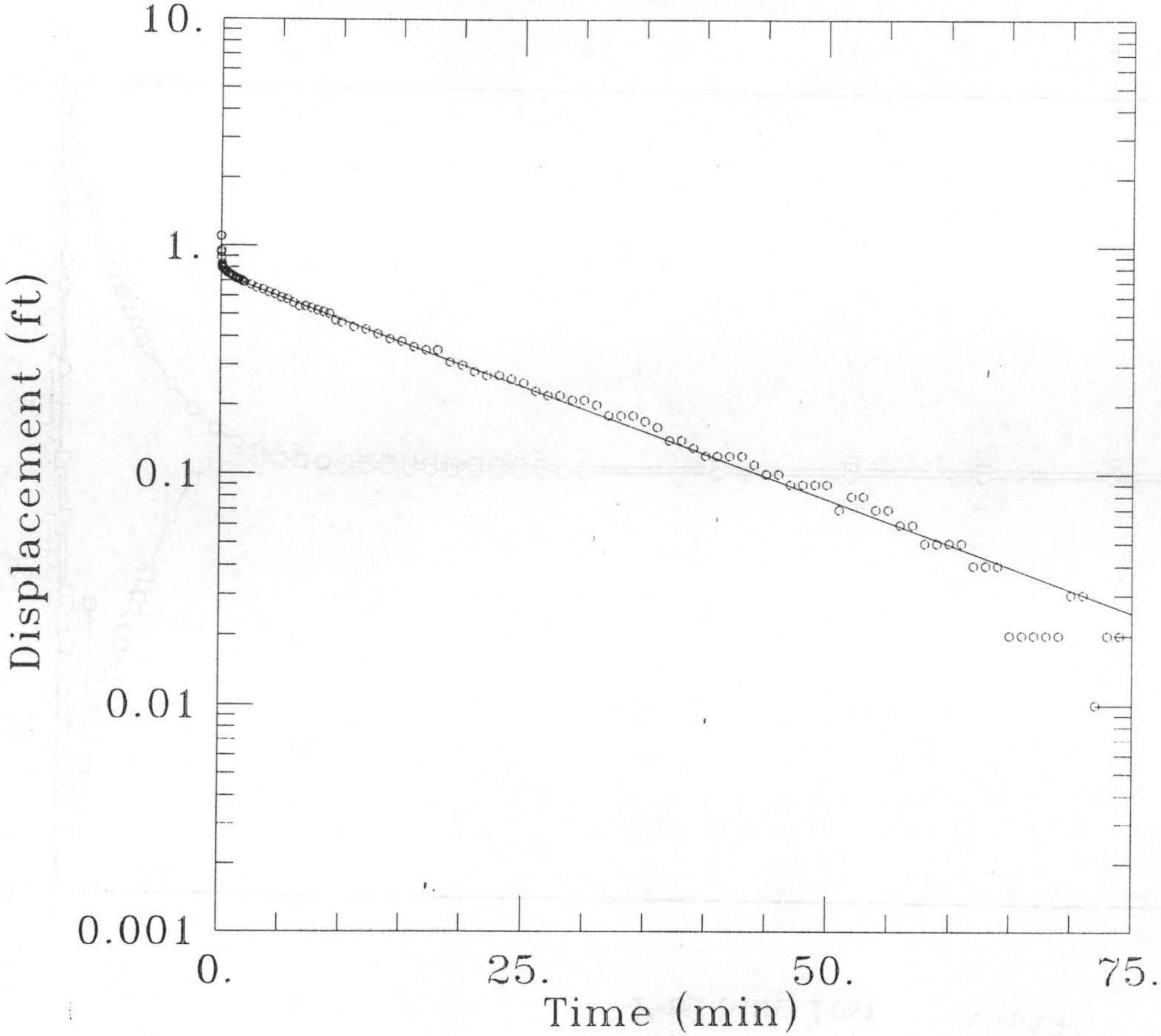


Figure 7

MW-21 Aquifer Tests




10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
25.
50.
75.
Time (min)
DATA SET:
MW21SI.DAT
10/23/97
AQUIFER MODEL:
Confined
SOLUTION METHOD:
Bouwer-Rice
PROJECT DATA:
test date: 8/17/97
TEST DATA:
H0 = 1.77 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 26.58 ft
H = 26.58 ft
PARAMETER ESTIMATES:
K = 3.873E-05 ft/min
y0 = 0.7841 ft
AQTESOLV



DATA SET:
MW21SO.DAT
10/23/97

AQUIFER MODEL:
Confined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/17/97

TEST DATA:
HO = 1.1 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 26.58 ft
H = 26.58 ft

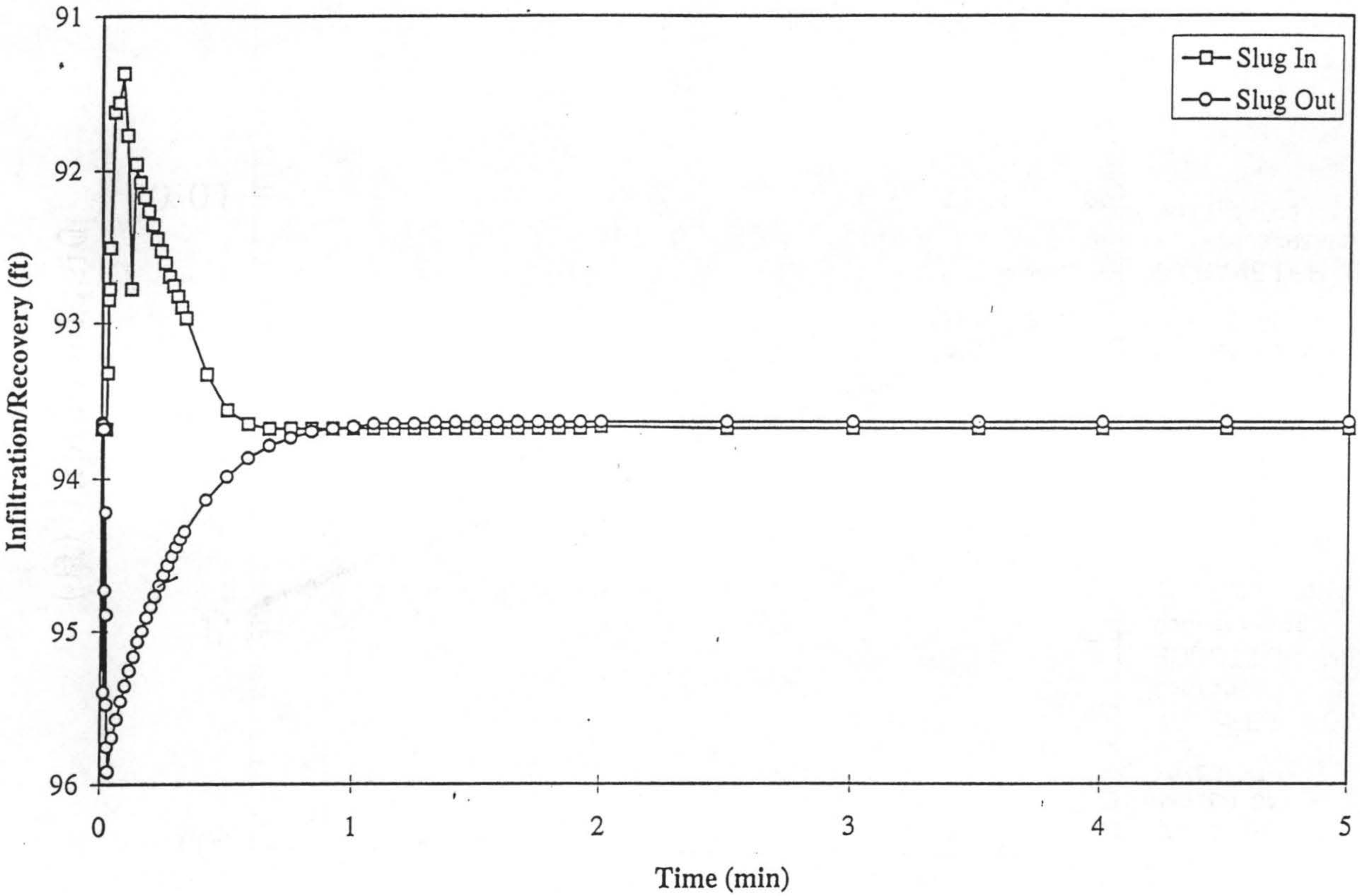
PARAMETER ESTIMATES:
K = 5.349E-05 ft/min
y0 = 0.743 ft

AQTESOLV

MW-22

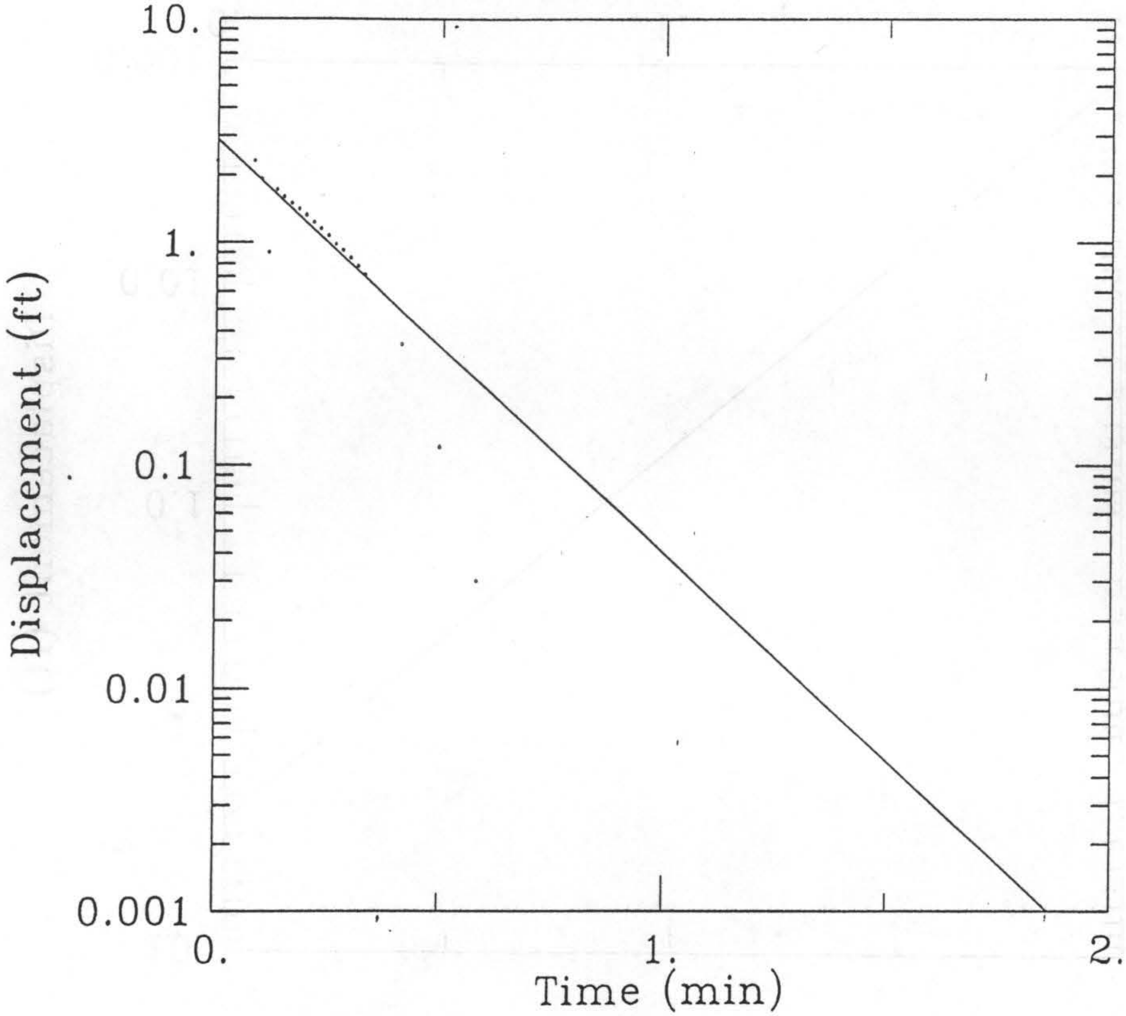
~~P-31~~ Slug Test

JH 12/19/97



JH 12/19/97

472



DATA SET:
P31SI.DAT Mw-27
09/25/95

AQUIFER MODEL:
Confined

SOLUTION METHOD:
Bouwer-Rice

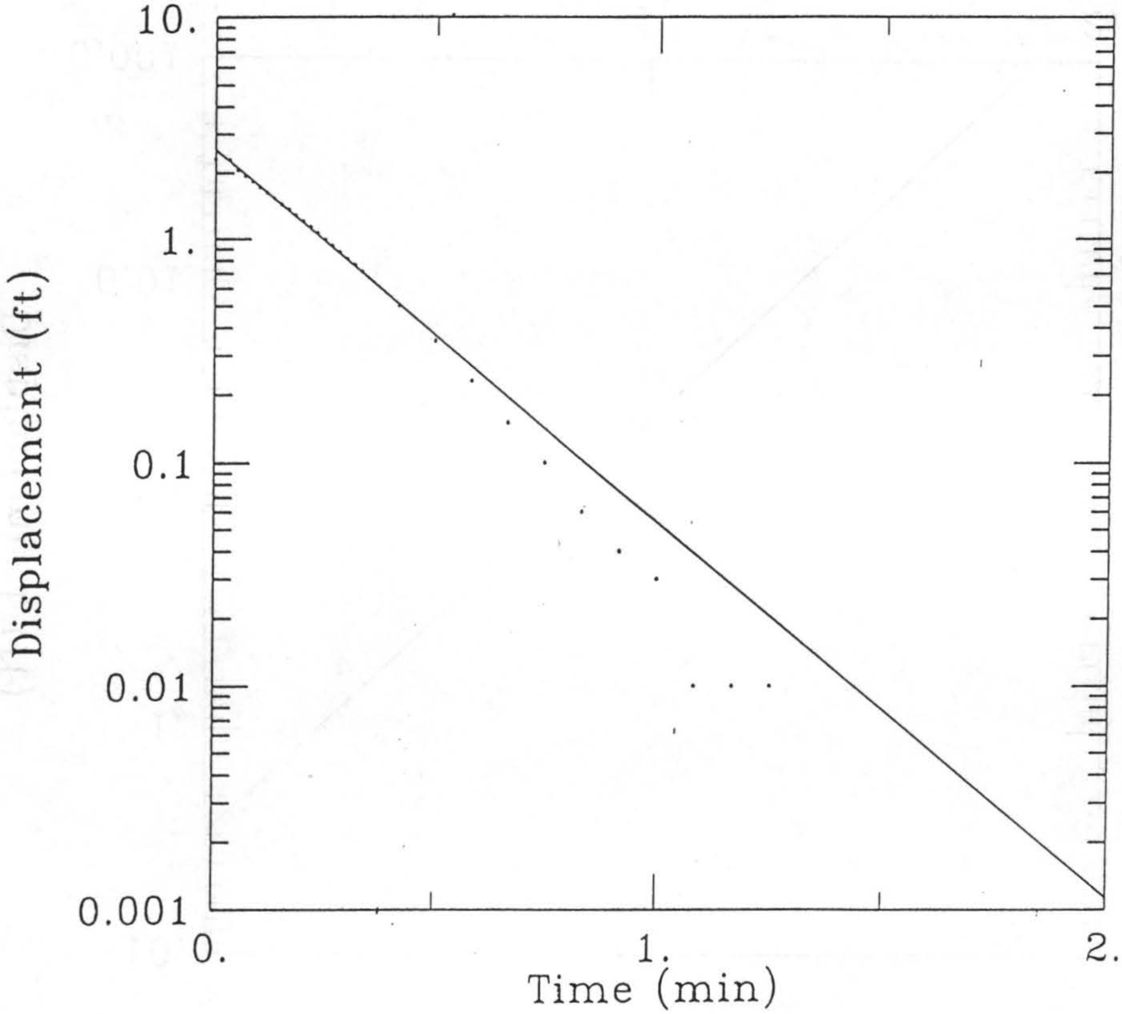
PROJECT DATA:
test date: 8/15/95

TEST DATA:
H0 = 2.31 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 27.5 ft
H = 27.5 ft

PARAMETER ESTIMATES:
K = 0.005093 ft/min
y0 = 2.889 ft

AQTESOLV

~~0004~~50 # 0050
12/19/97



DATA SET:
P31SO.DAT MW-22
09/25/95

AQUIFER MODEL:
Confined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/15/95

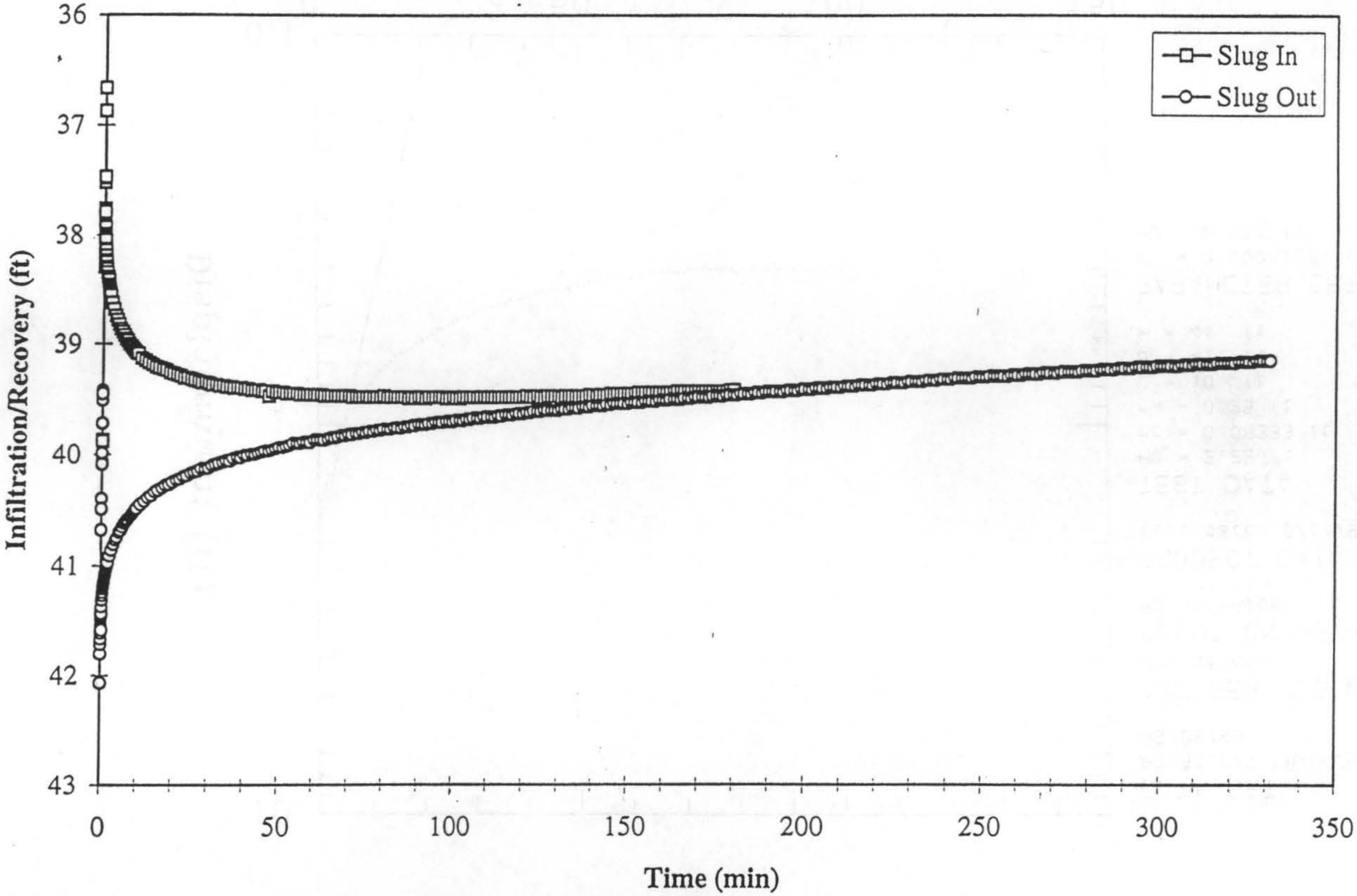
TEST DATA:
H0 = 2.31 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 27.5 ft
H = 27.5 ft

PARAMETER ESTIMATES:
K = 0.004596 ft/min
y0 = 2.55 ft

AQTESOLV

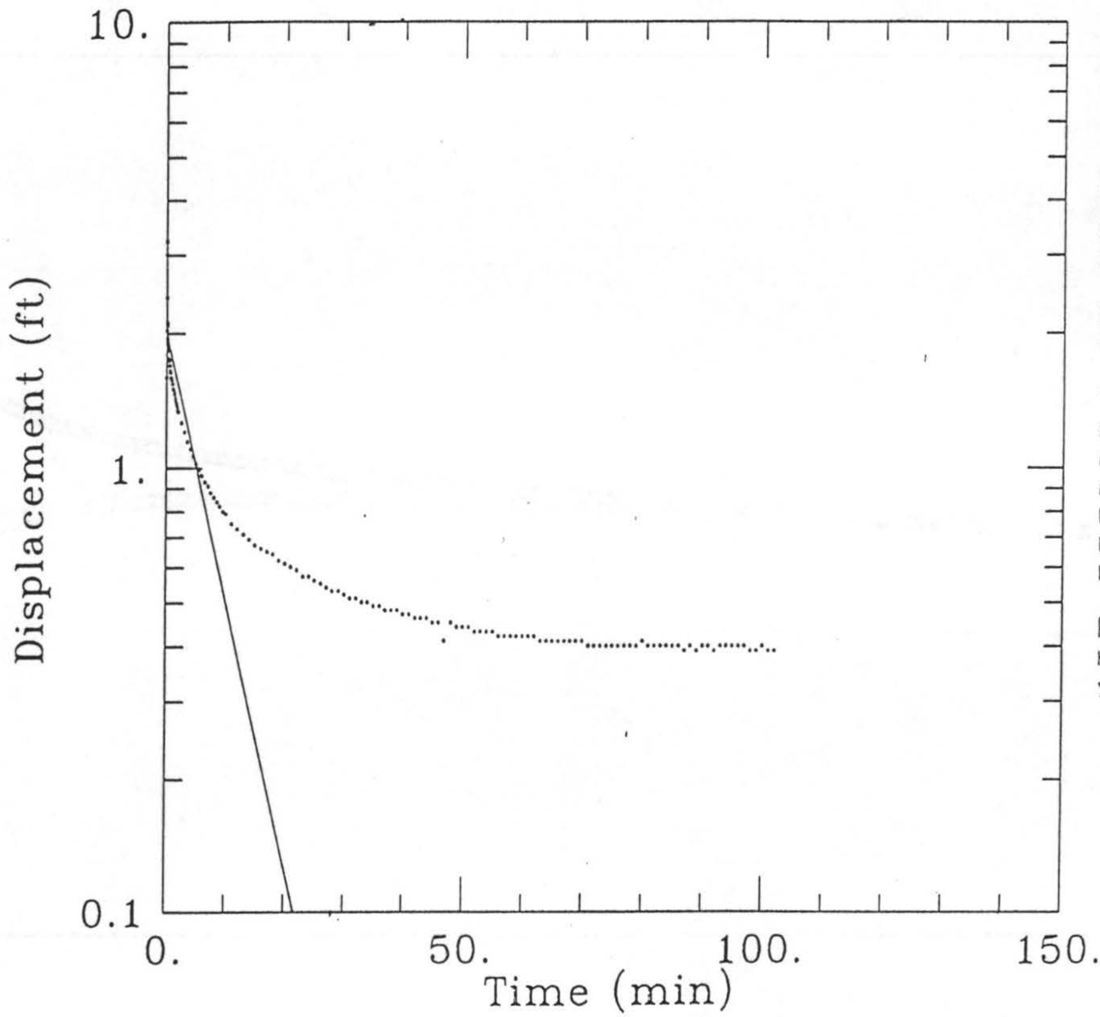
MW-23
JH
12/19/97

~~P-30~~ Slug Test



~~000476~~
JH
12/19/97

475



DATA SET:
P30SI.DAT MW-23
09/22/95

AQUIFER MODEL:
Unconfined

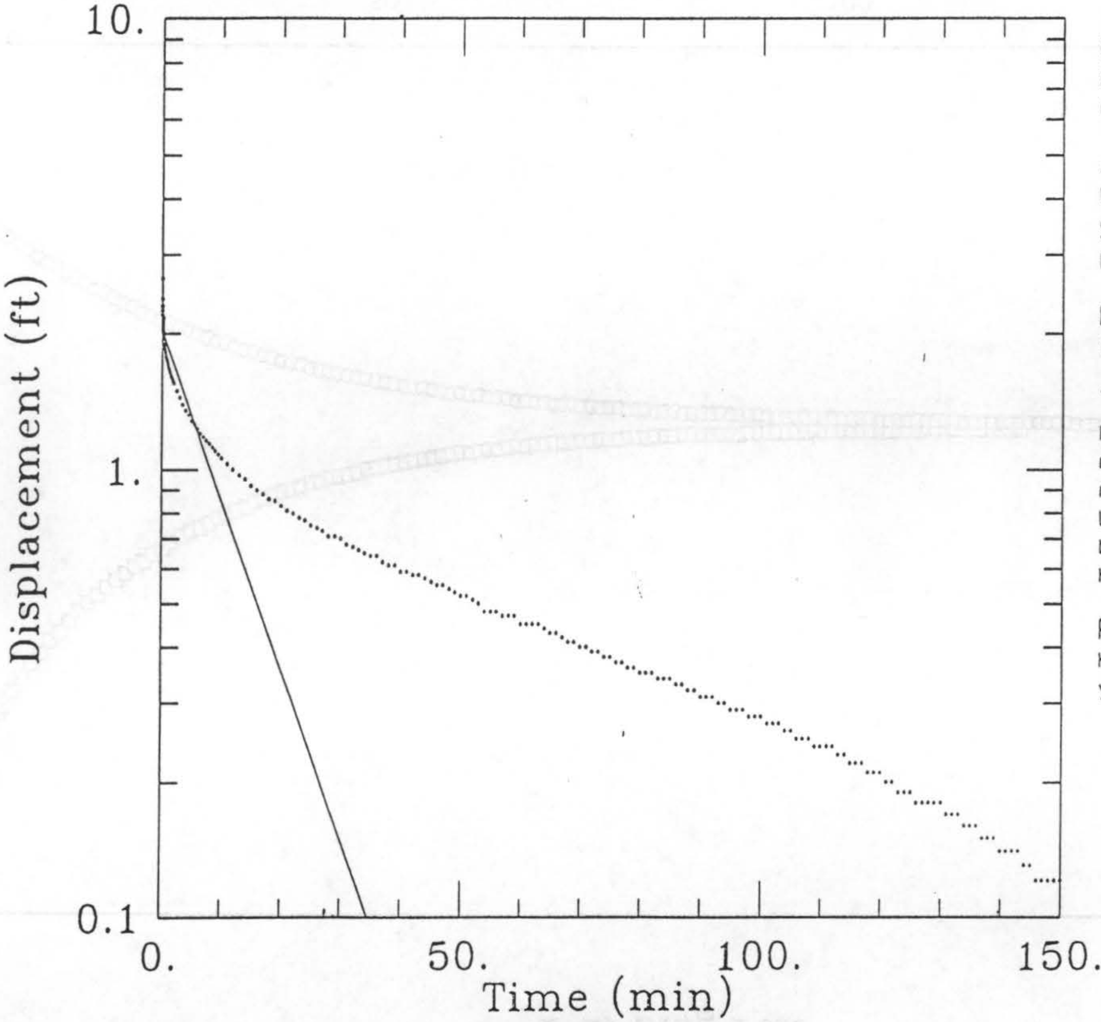
SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/14/95

TEST DATA:
H0 = 3.22 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 41. ft
H = 41. ft

PARAMETER ESTIMATES:
K = 0.0001752 ft/min
y0 = 2.001 ft

AQTESOLV



DATA SET:
P30S0.DAT MW-23
09/22/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/14/95

TEST DATA:
H0 = 2.65 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 41. ft
H = 41. ft

PARAMETER ESTIMATES:
K = 0.0001105 ft/min
y0 = 2.031 ft

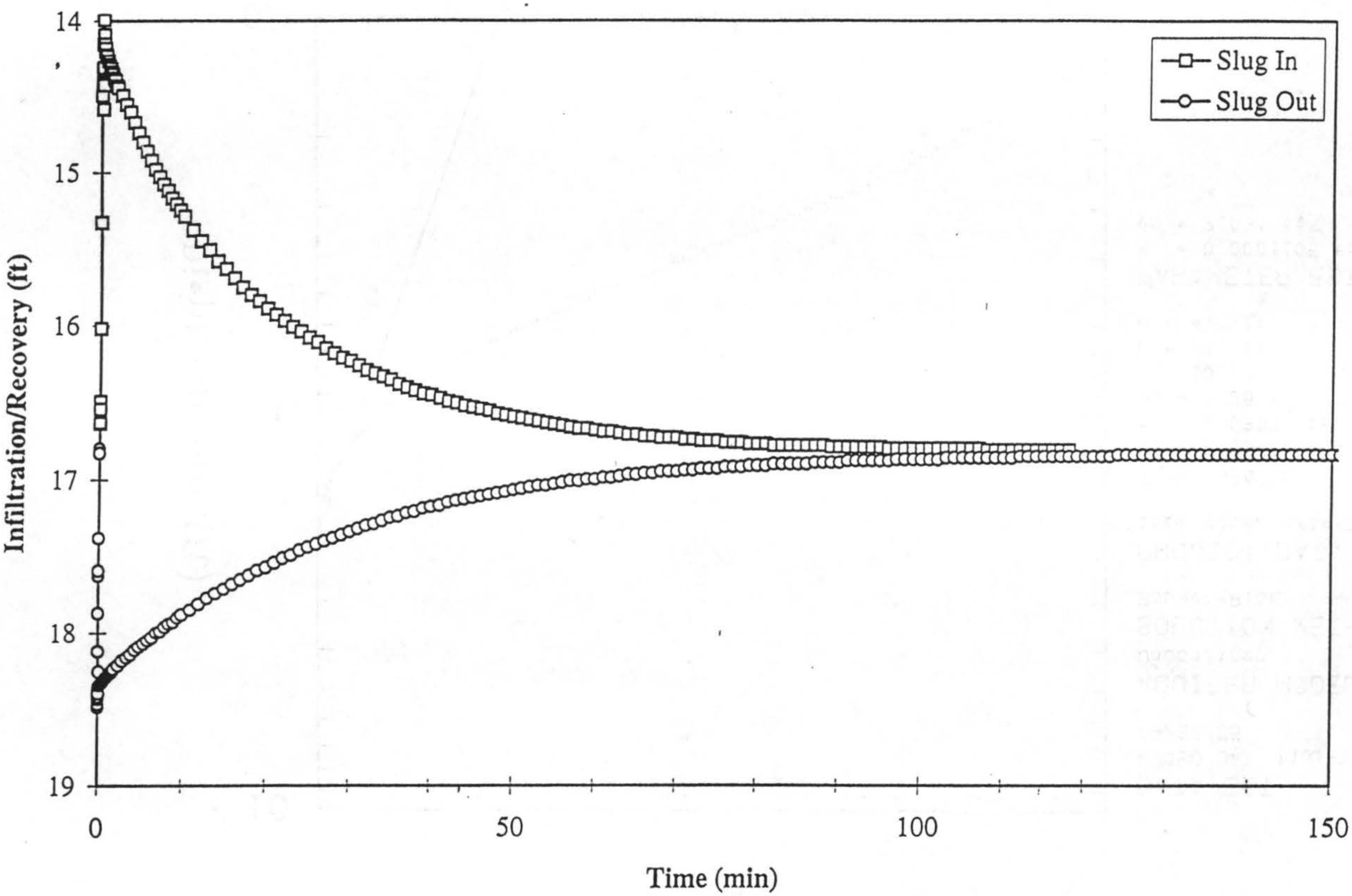
AQTESOLV

~~000448~~ JK 12/18/97

477

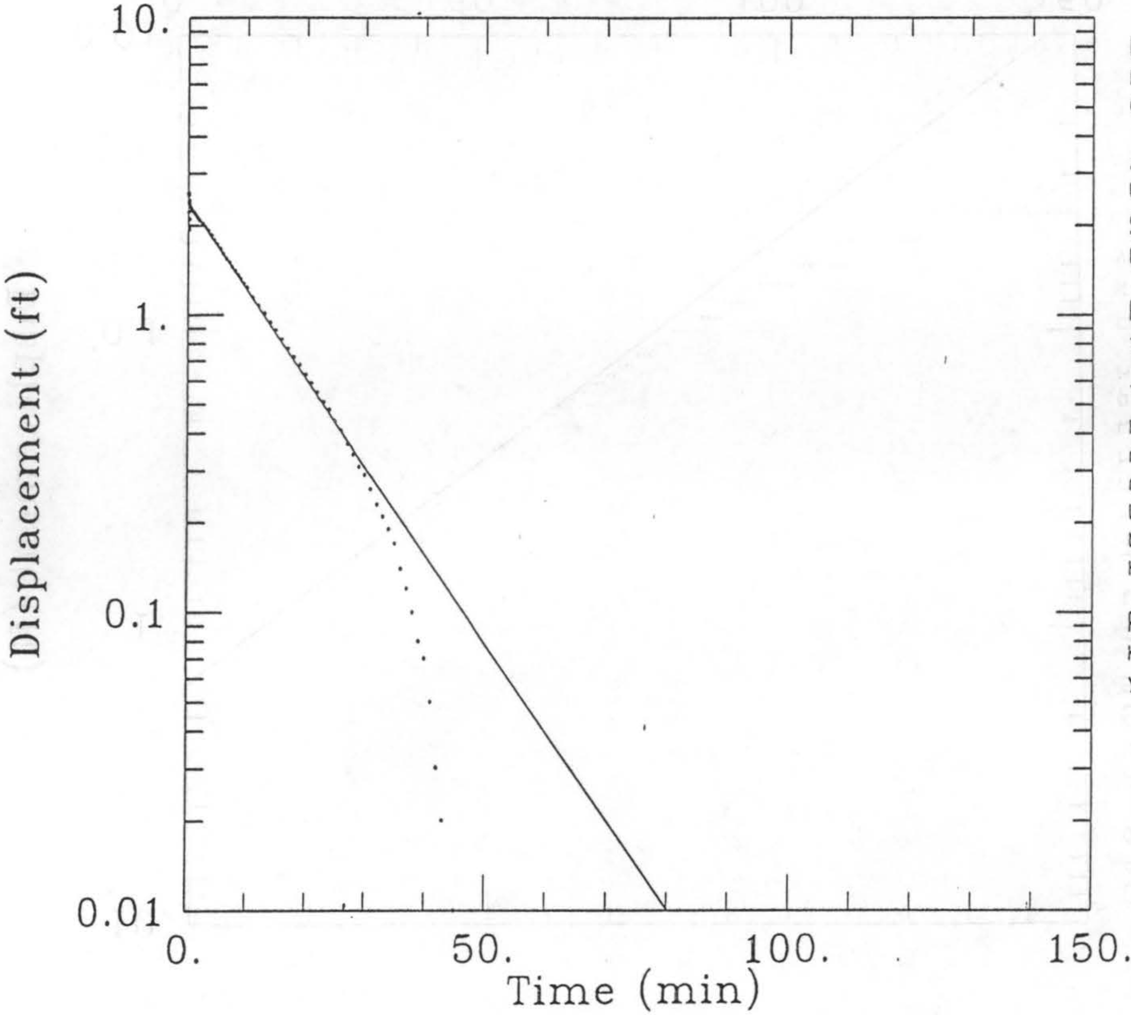
MW-24
~~MW-25D~~
~~P-29~~ Slug Test

JH 12/12/97



000443 JH 12/12/97

478



DATA SET:
P29SI.DAT MW-24
09/22/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/16/95

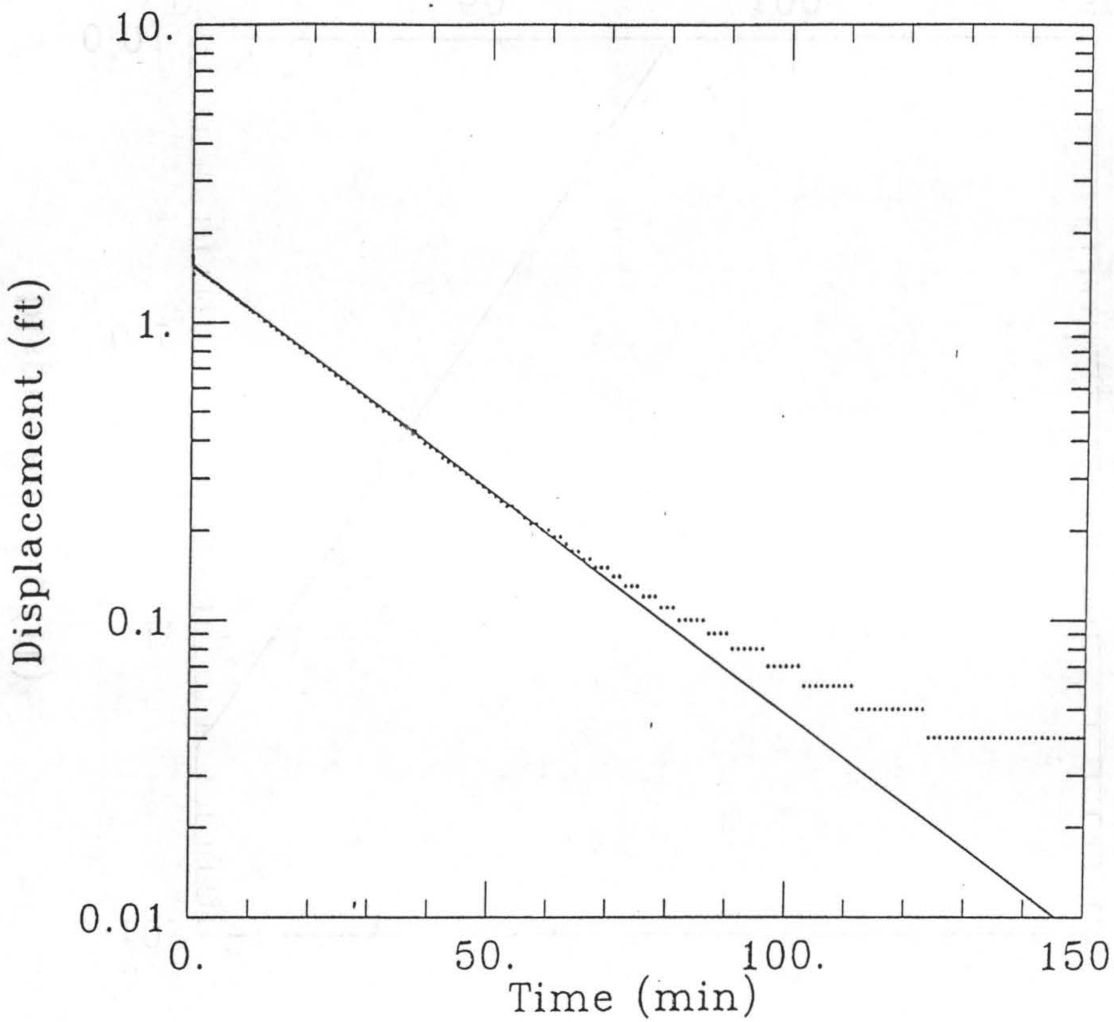
TEST DATA:
H0 = 2.57 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 59.5 ft
H = 59.5 ft

PARAMETER ESTIMATES:
K = 9.177E-05 ft/min
y0 = 2.384 ft

AQTESOLV

~~000447~~ 12/19/97

479



DATA SET:
P29SO.DAT rw-24
09/22/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/16/95

TEST DATA:
H0 = 1.68 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 59.5 ft
H = 59.5 ft

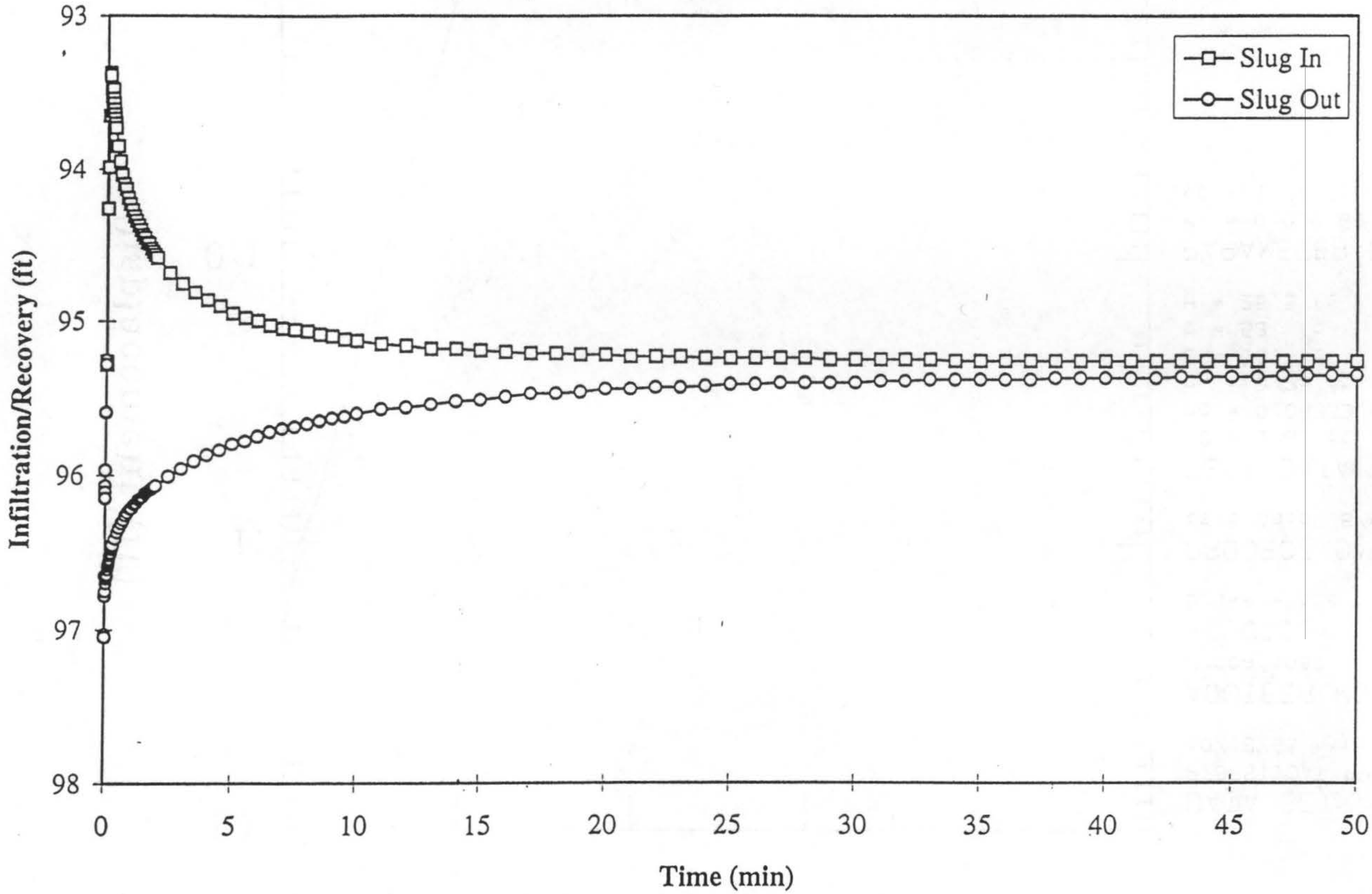
PARAMETER ESTIMATES:
K = 4.664E-05 ft/min
y0 = 1.551 ft

AQTESOLV

~~0004475~~ 12/5/97

480

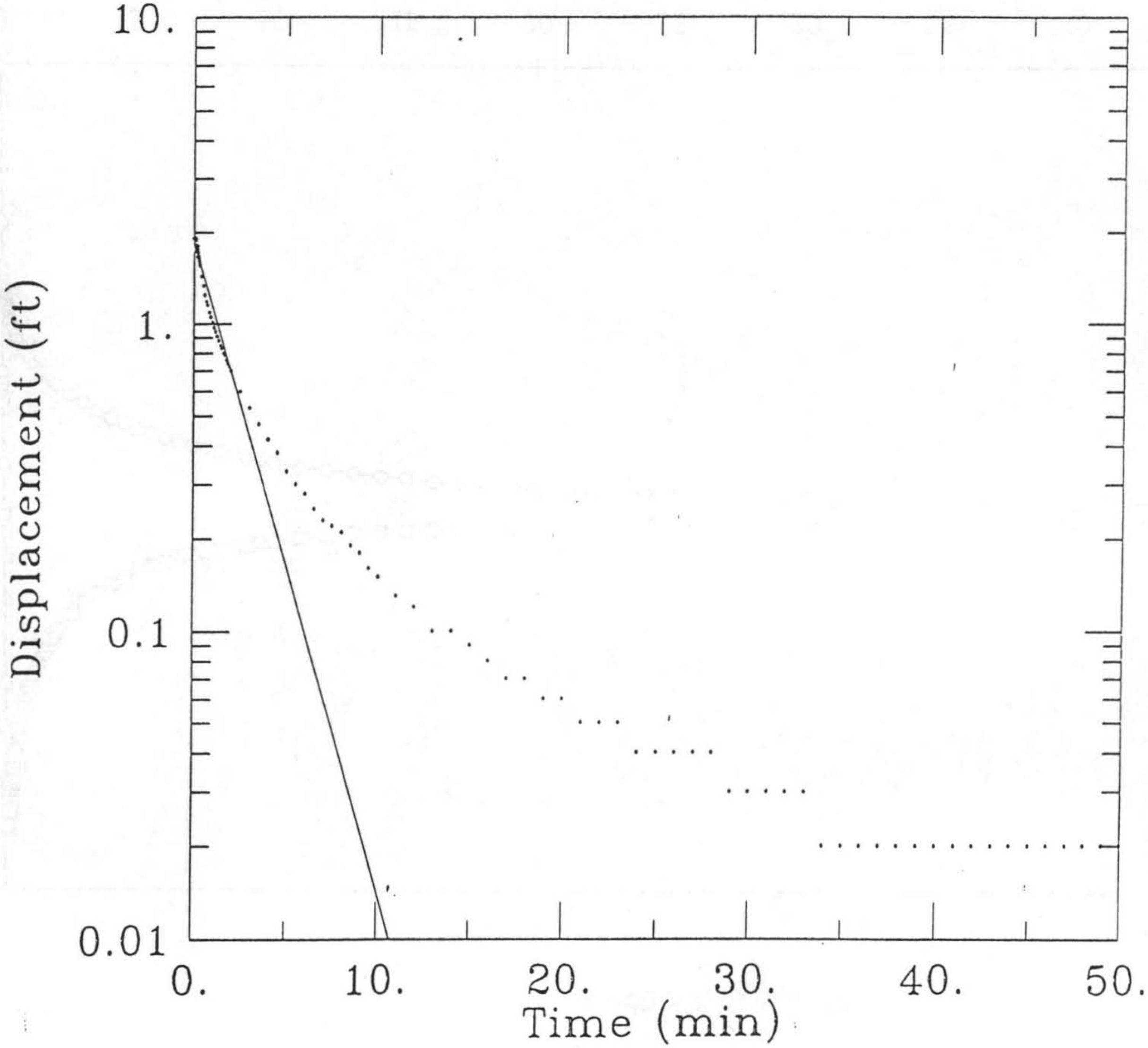
MW-25S
~~P-28S~~ Slug Test



000437

JK 12/9/92

481



DATA SET:
P28SSI.DAT MW-25S
10/18/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/15/95

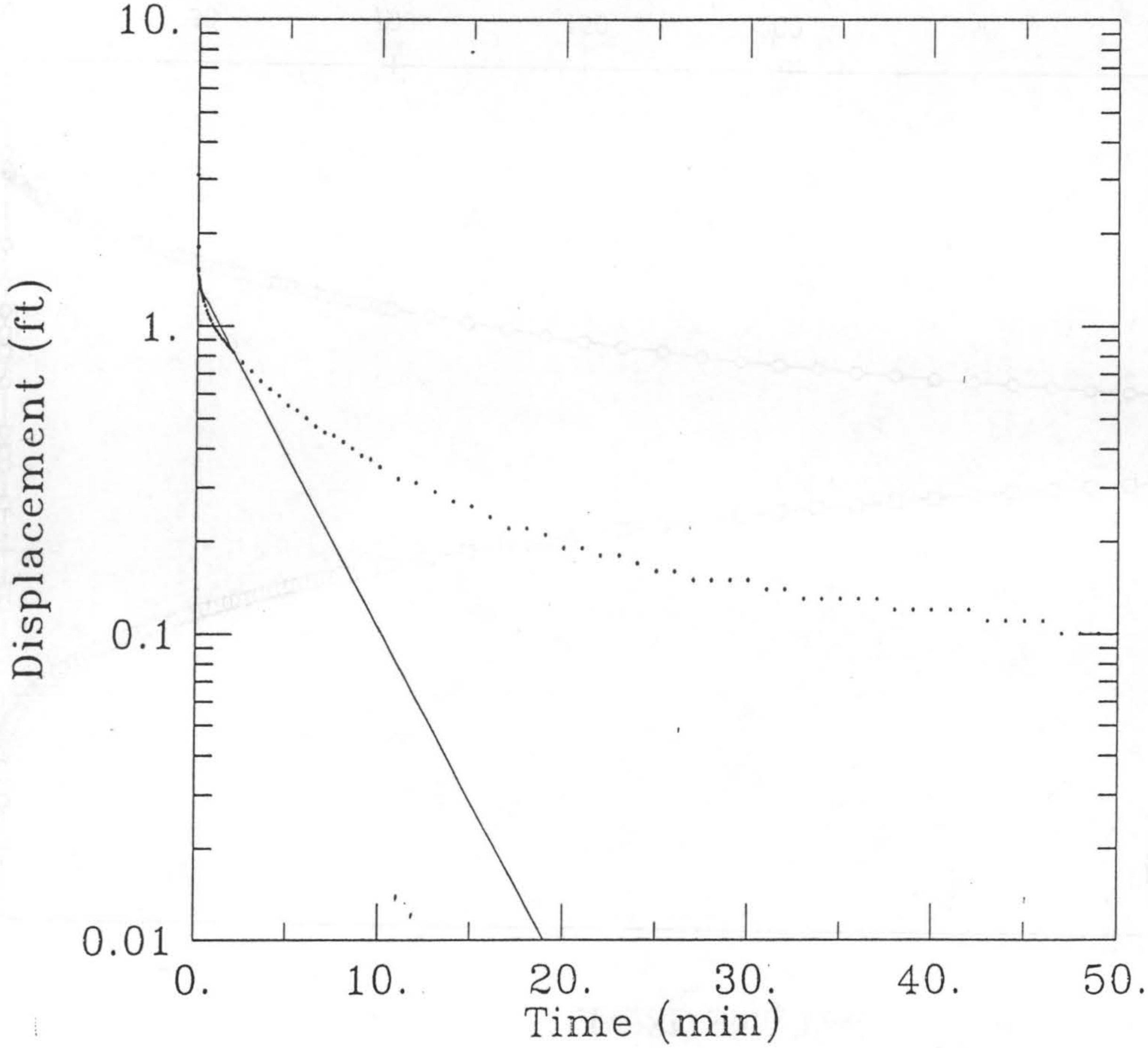
TEST DATA:
H0 = 1.91 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 53. ft
H = 25.5 ft

PARAMETER ESTIMATES:
K = 0.000469 ft/min
y0 = 1.84 ft

AQTESOLV

~~0004238~~ JK 12/15/97

482



DATA SET:
P28SS0.DAT MW-25S
10/18/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/15/95

TEST DATA:
H0 = 3.1 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 53. ft
H = 25.5 ft

PARAMETER ESTIMATES:
K = 0.0002502 ft/min
y0 = 1.376 ft

AQTESOLV

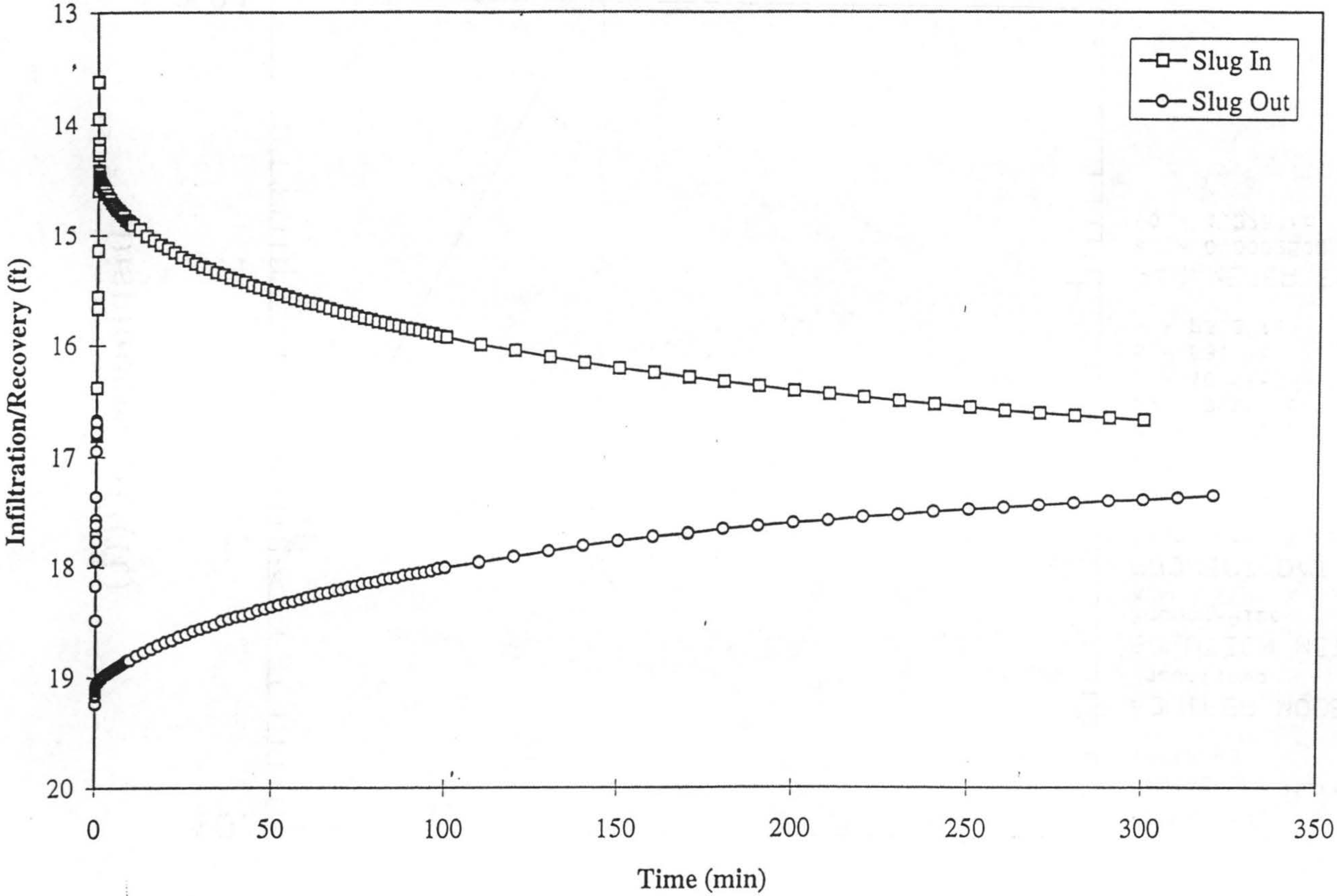
~~0004439~~

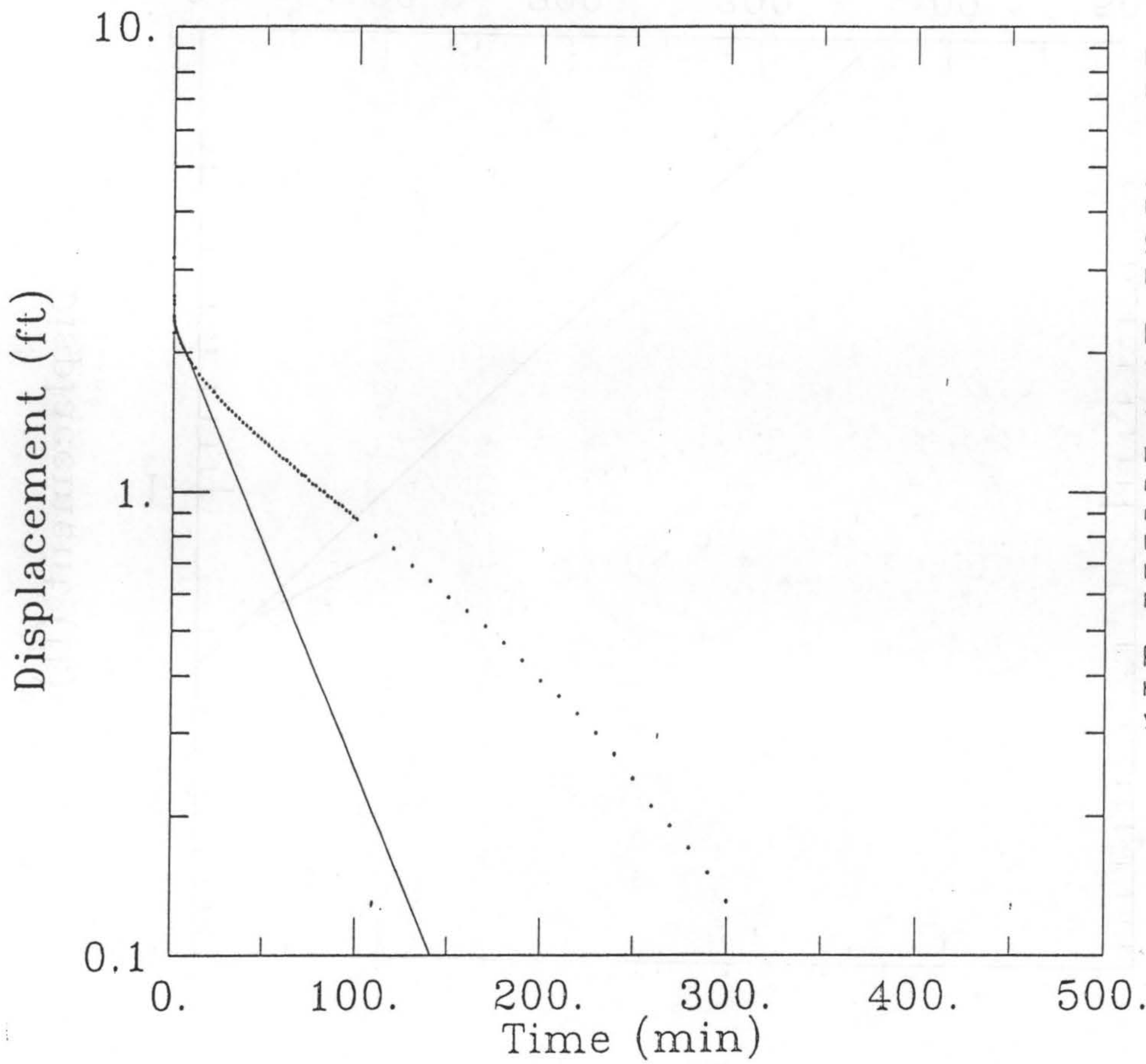
JH 12/19/97

483

MW-25D JH 12/19/97

~~P-28D~~ Slug Test





DATA SET:
P28DSI.DAT MW-25D
10/18/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

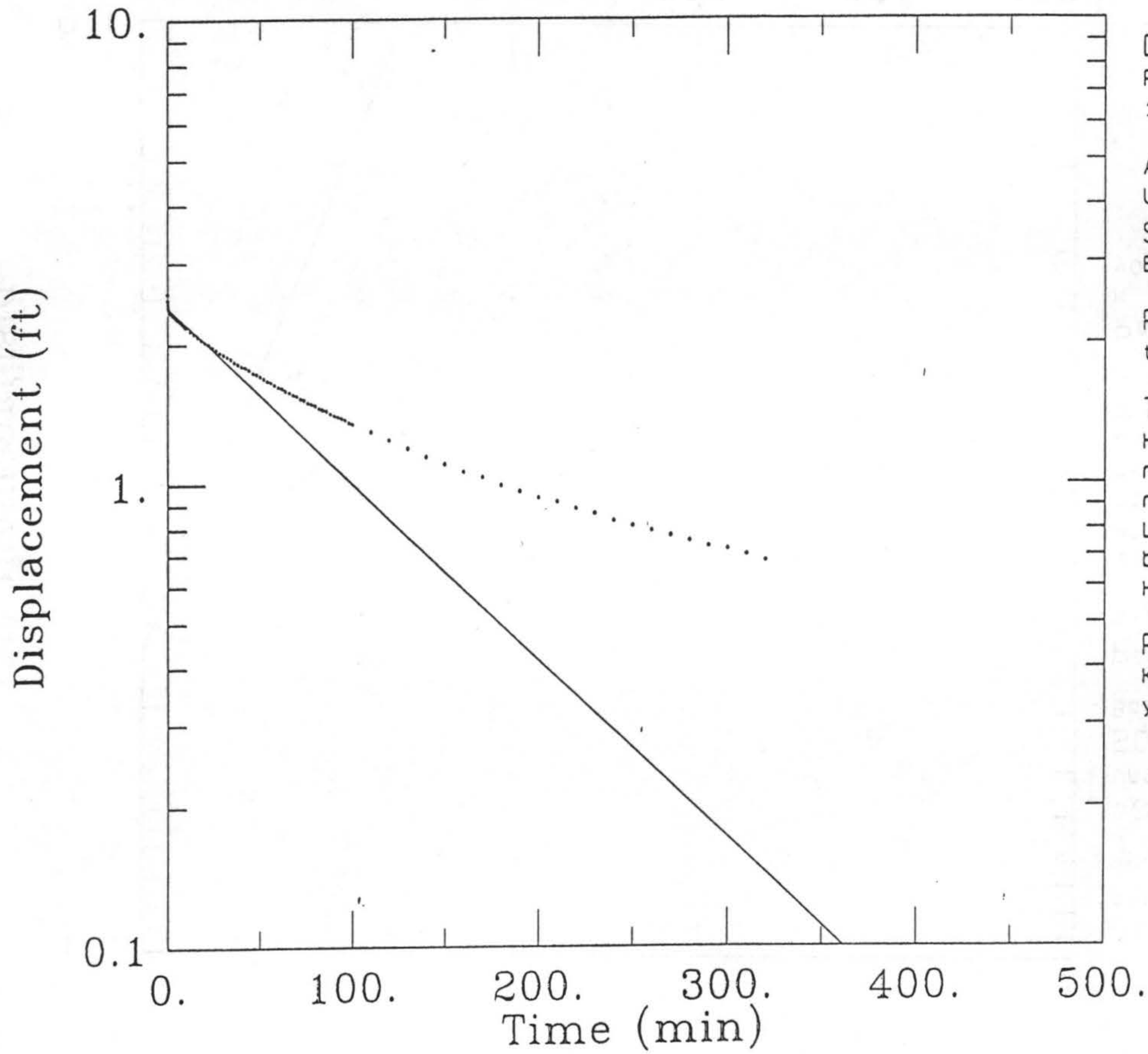
PROJECT DATA:
test date: 10/13/95

TEST DATA:
H0 = 3.18 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 53. ft
H = 53. ft

PARAMETER ESTIMATES:
K = 2.942E-05 ft/min
y0 = 2.316 ft

AQTESOLV

~~000441~~ 12/19/97



DATA SET:
P28DS0.DAT MW-25D
10/18/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 10/13/95

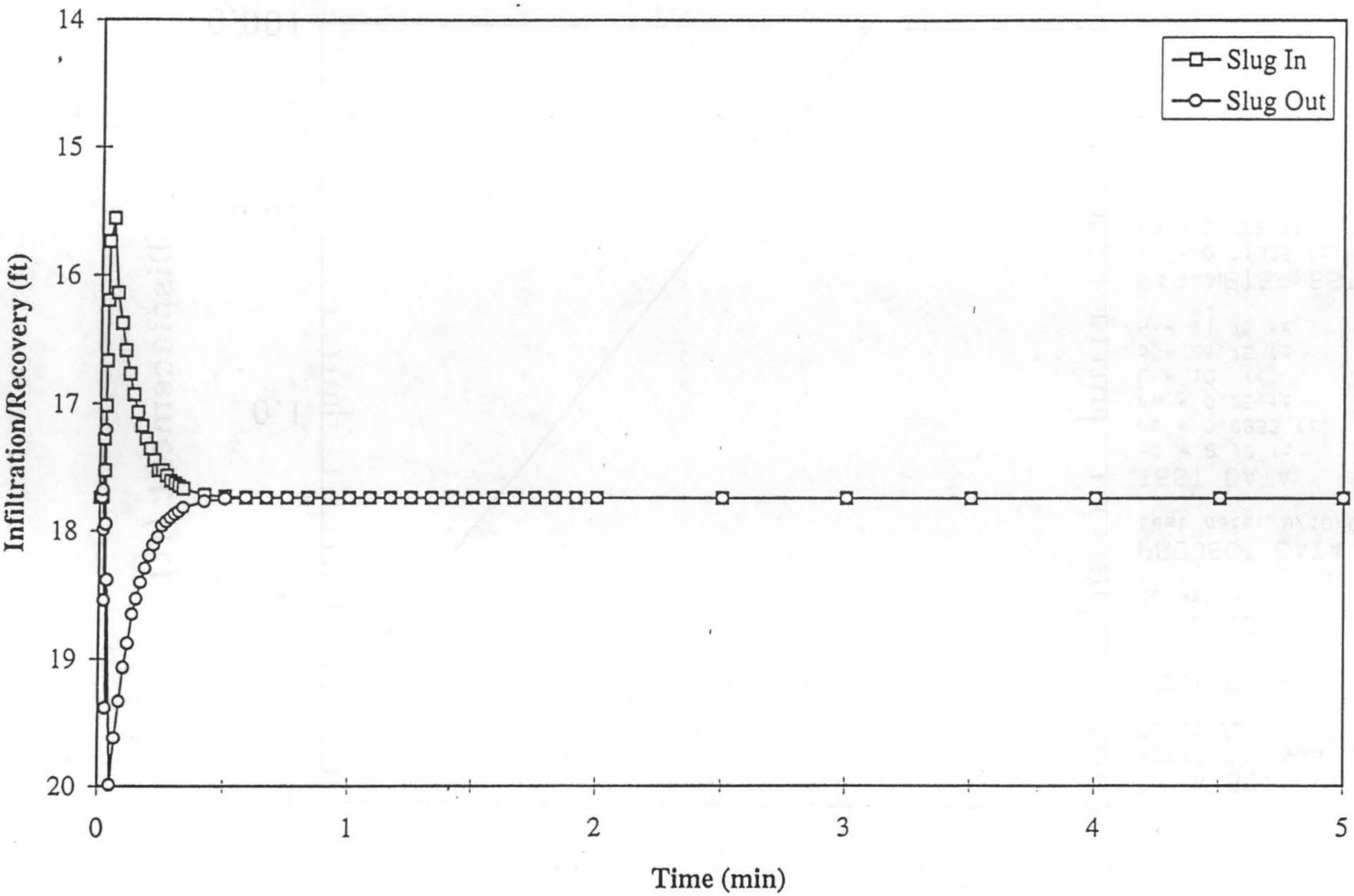
TEST DATA:
H0 = 2.57 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 53. ft
H = 53. ft

PARAMETER ESTIMATES:
K = 1.162E-05 ft/min
y0 = 2.408 ft

AQTESOLV

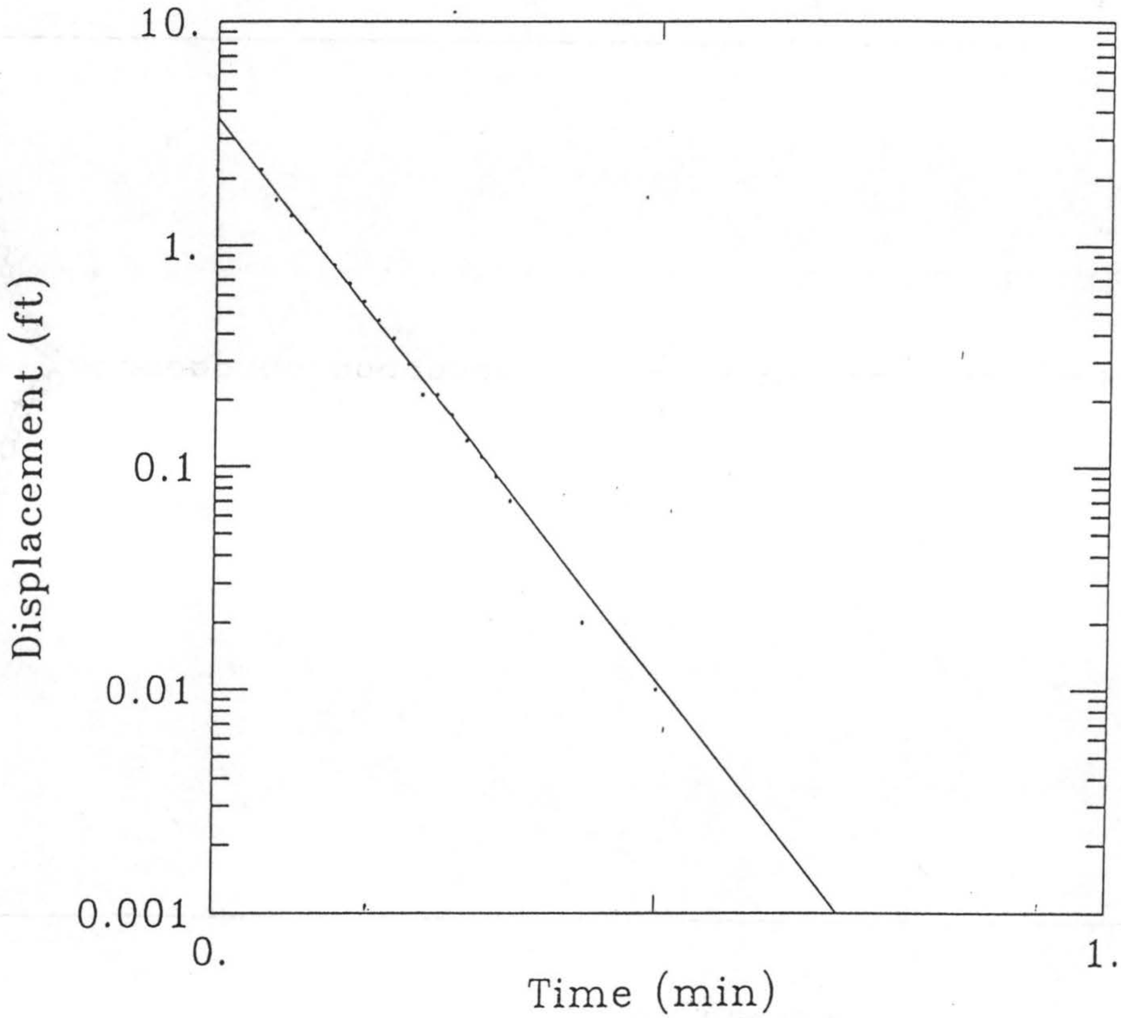
MW-27 JH 12/19/97

~~P-26~~ Slug Test



00004374 JH 12/19/97

487



DATA SET:
P26SI.DAT MW-27
09/25/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

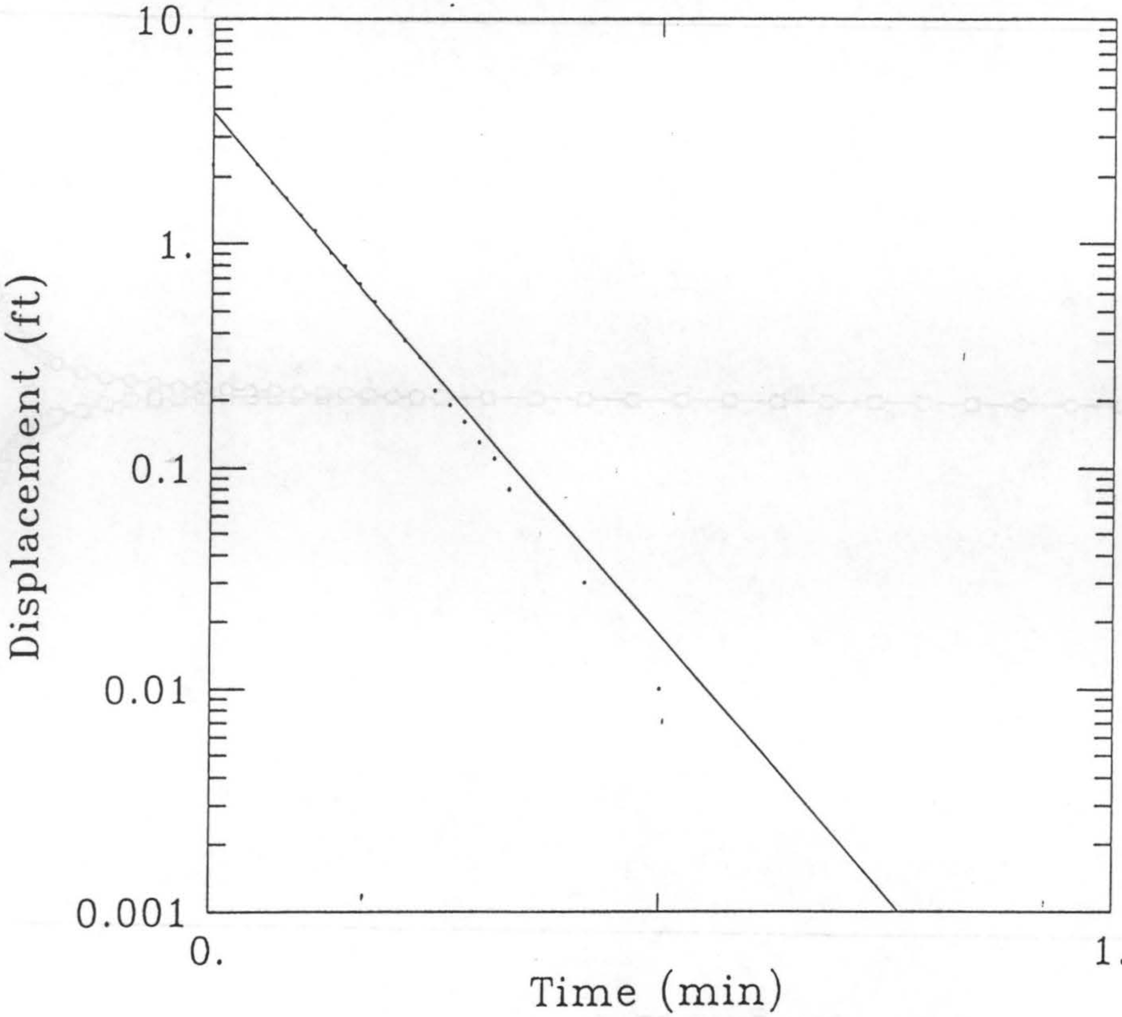
PROJECT DATA:
test date: 8/10/95

TEST DATA:
H0 = 2.18 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 21.75 ft
H = 21.75 ft

PARAMETER ESTIMATES:
K = 0.01335 ft/min
y0 = 3.732 ft

AQTESOLV

0004435



DATA SET:
P26S0.DAT HCW-27
09/25/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/10/95

TEST DATA:
H0 = 2.25 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 21.75 ft
H = 21.75 ft

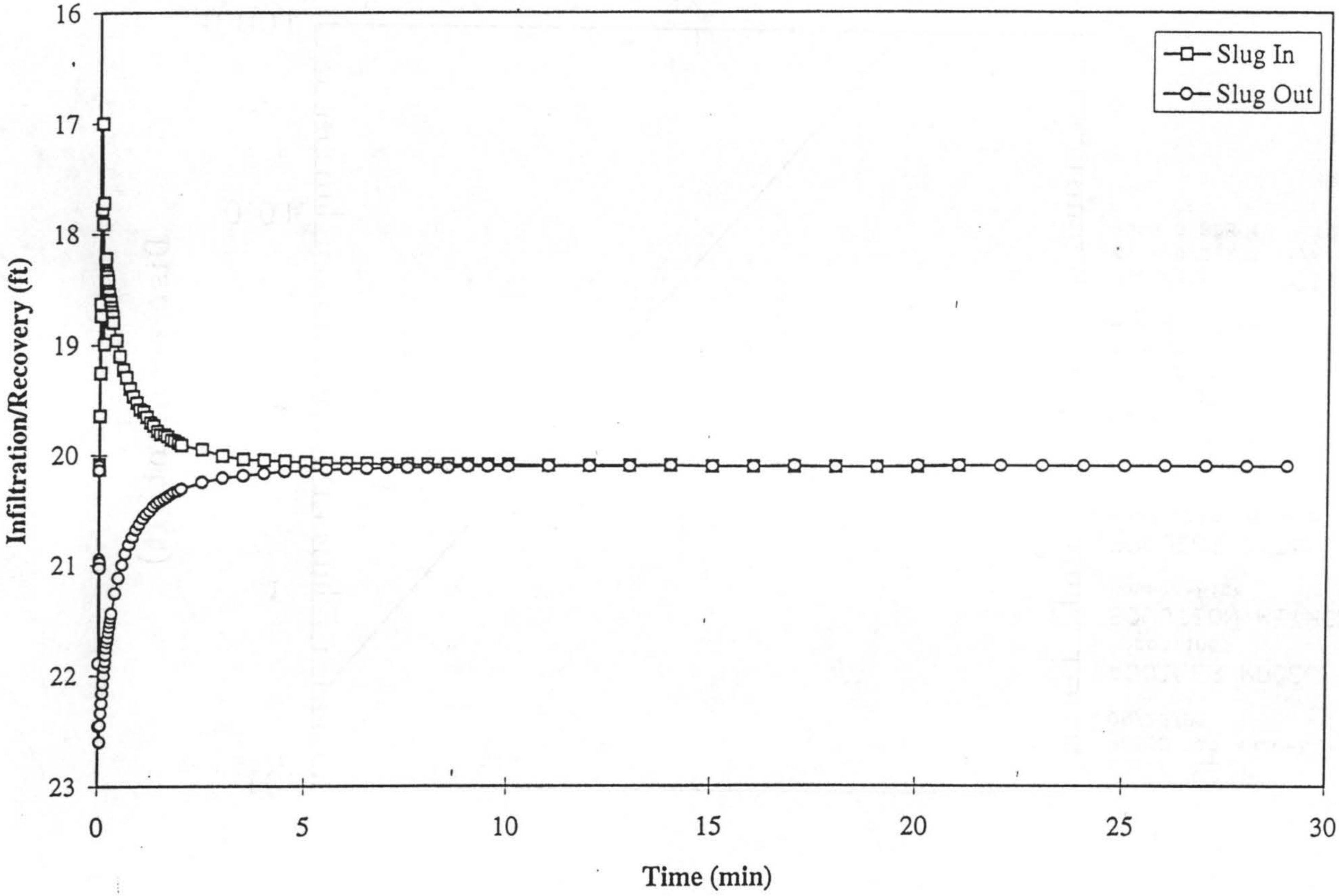
PARAMETER ESTIMATES:
K = 0.01237 ft/min
y0 = 3.896 ft

AQTESOLV

0004136
JK 12/19/97

MW-28 ~~P-25~~ Slug Test

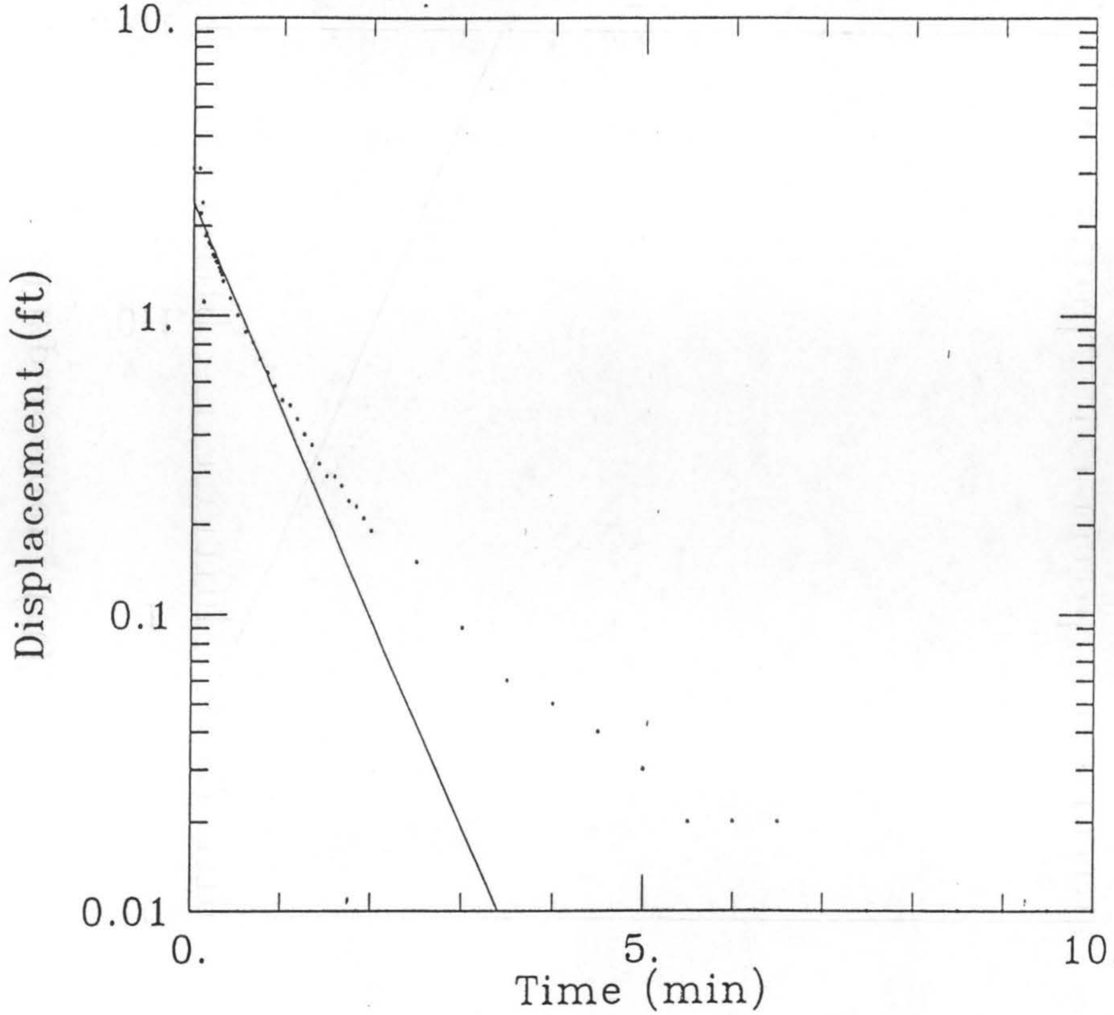
JH 12/19/97



0000431

JH 12/19/97

490



DATA SET:
P25SI.DAT MW-28
09/22/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/1/95

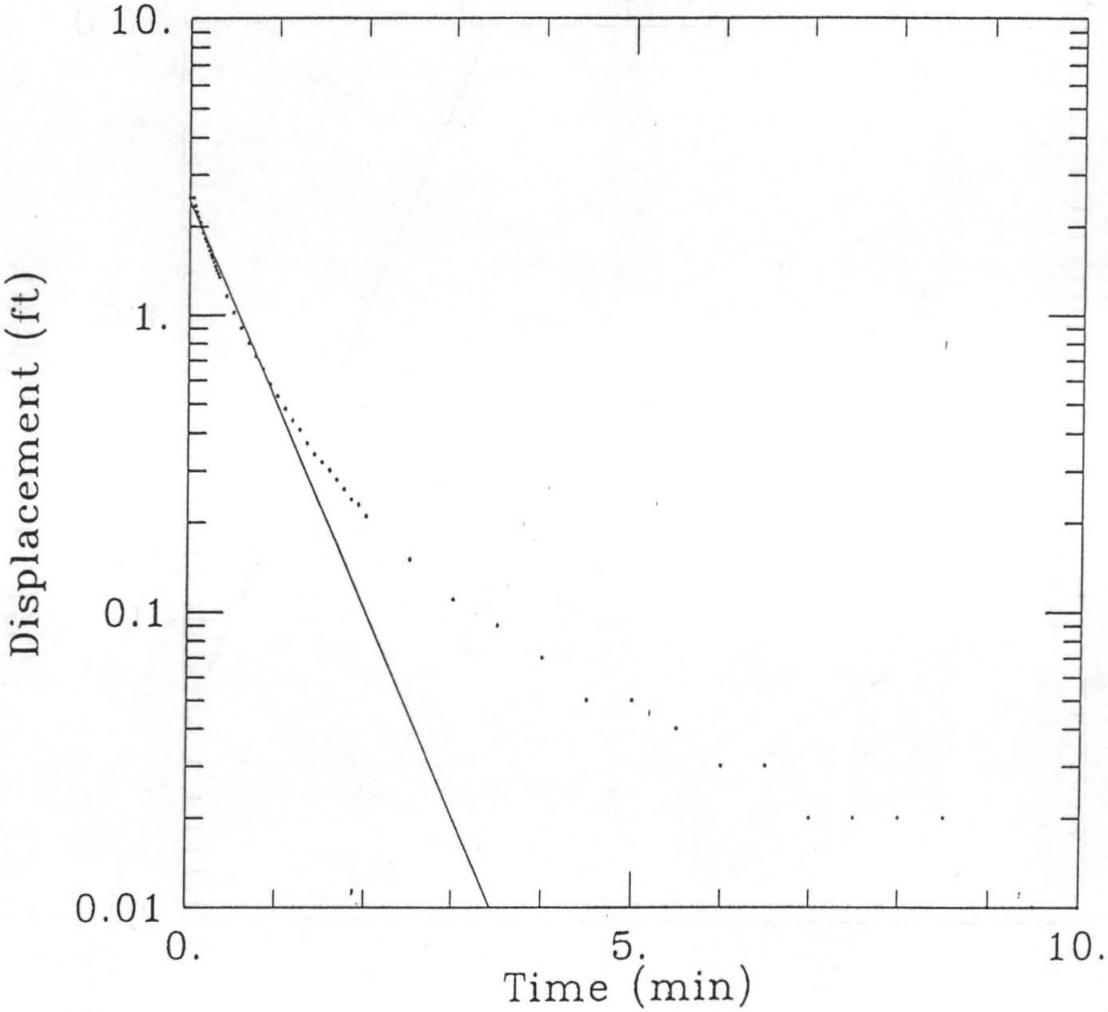
TEST DATA:
H0 = 3.1 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 40.5 ft
H = 40.5 ft

PARAMETER ESTIMATES:
K = 0.002041 ft/min
y0 = 2.38 ft

AQTESOLV

~~0004~~352
JH 12/19/97

491



DATA SET:
P25SO.DAT MW-28
09/22/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/1/95

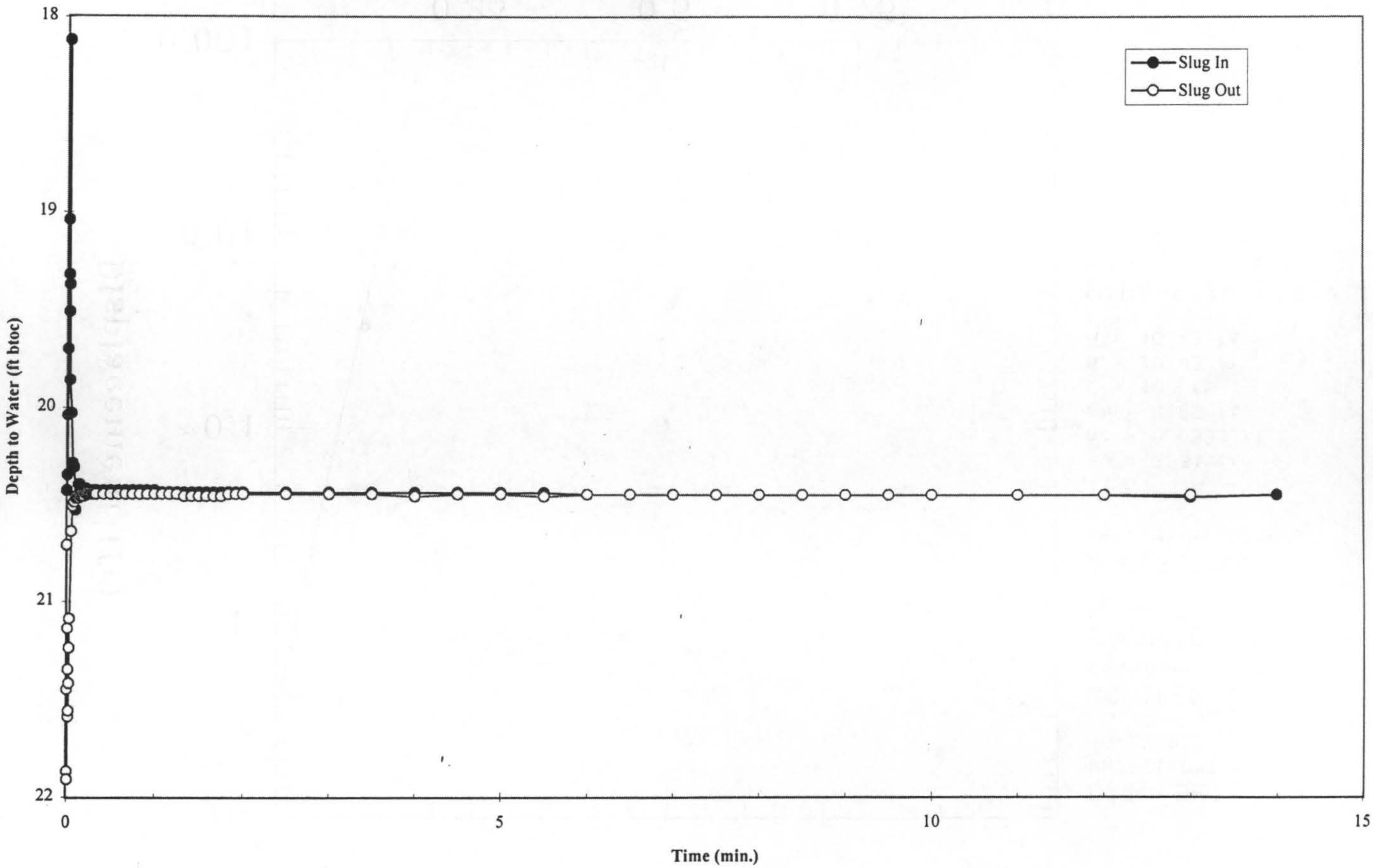
TEST DATA:
H0 = 2.5 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 40.5 ft
H = 40.5 ft

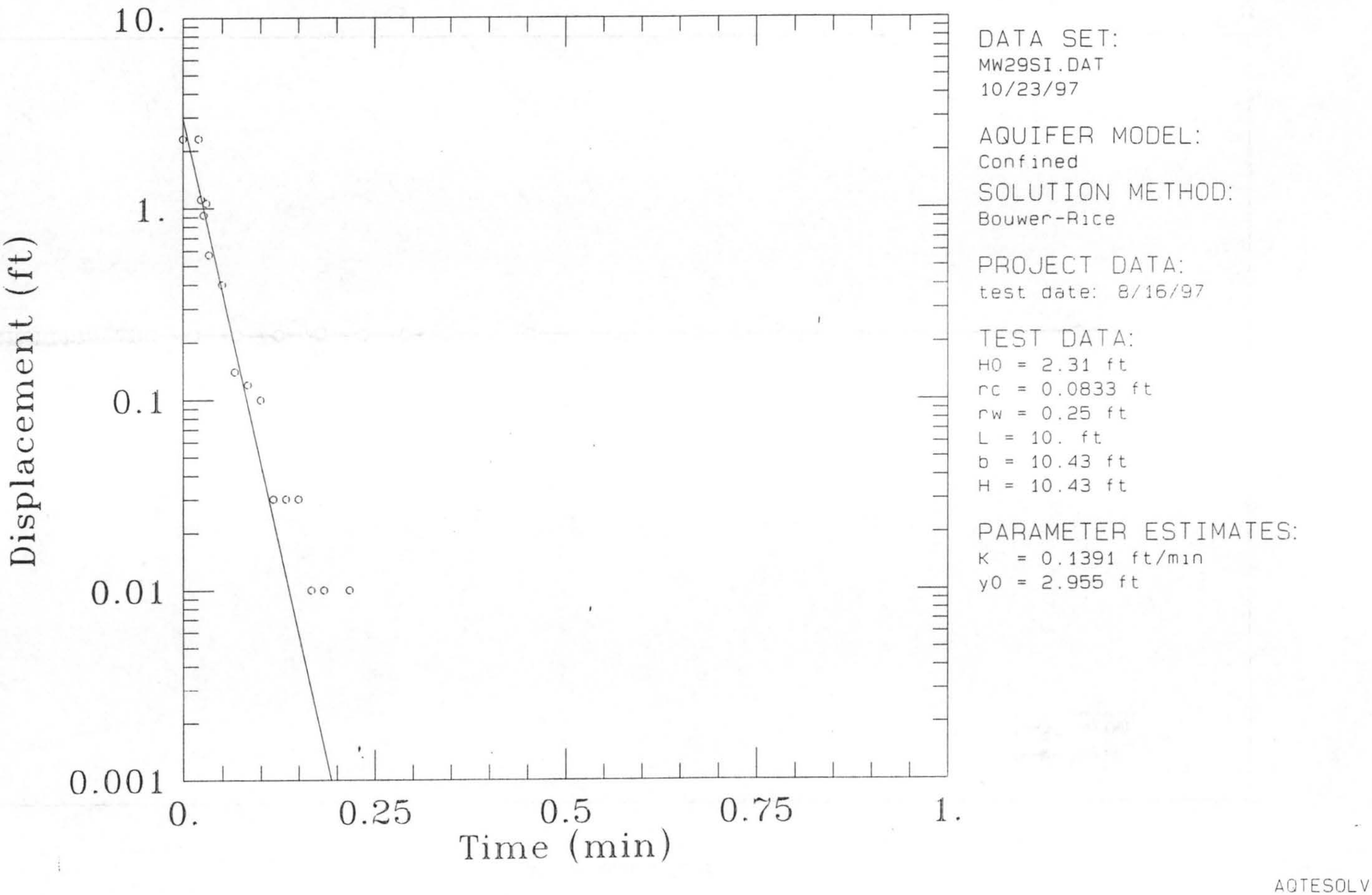
PARAMETER ESTIMATES:
K = 0.002031 ft/min
y0 = 2.438 ft

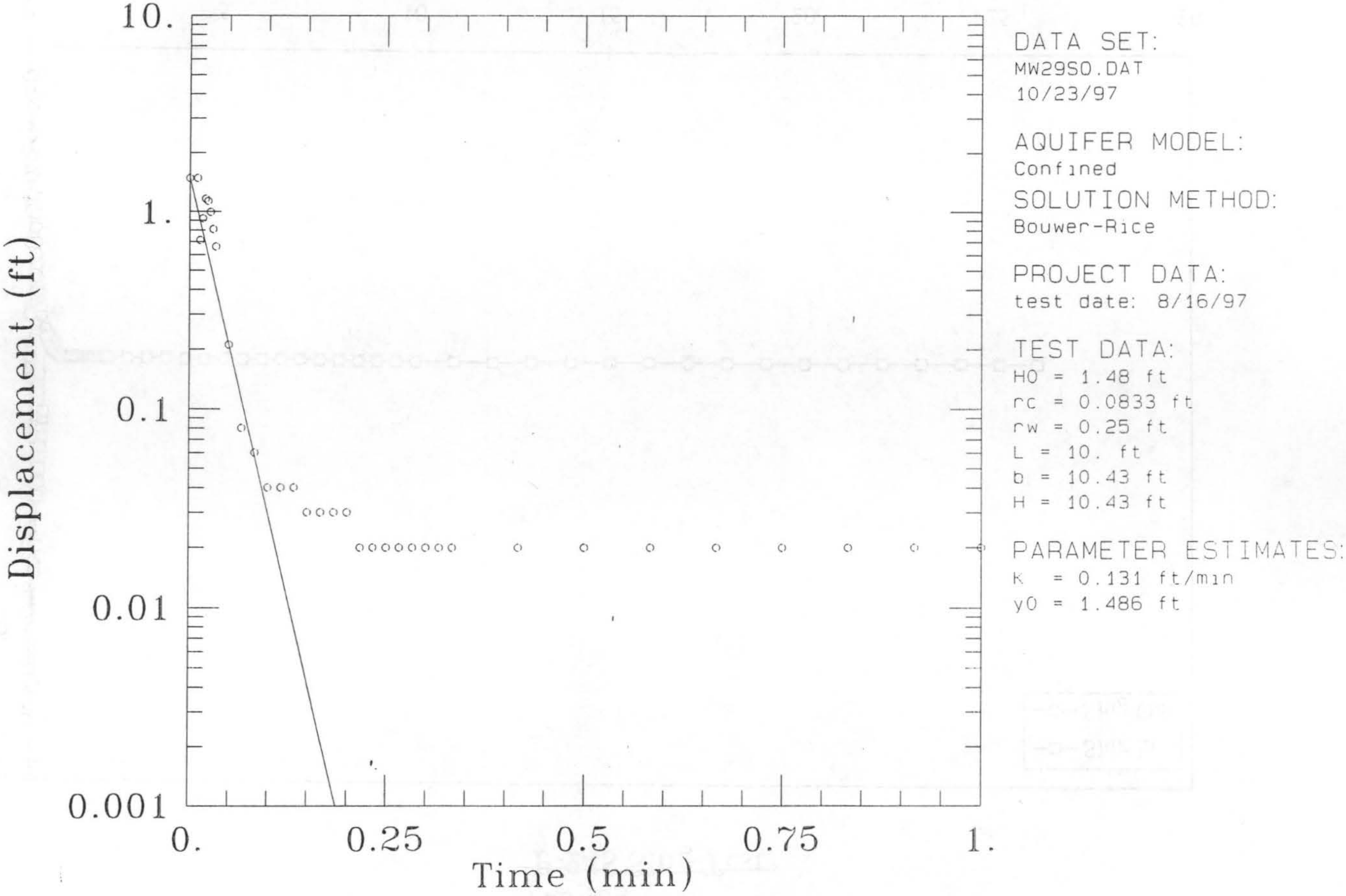
AQTESOLV

~~0000433~~ 3 12/19/97

MW-29 Aquifer Tests



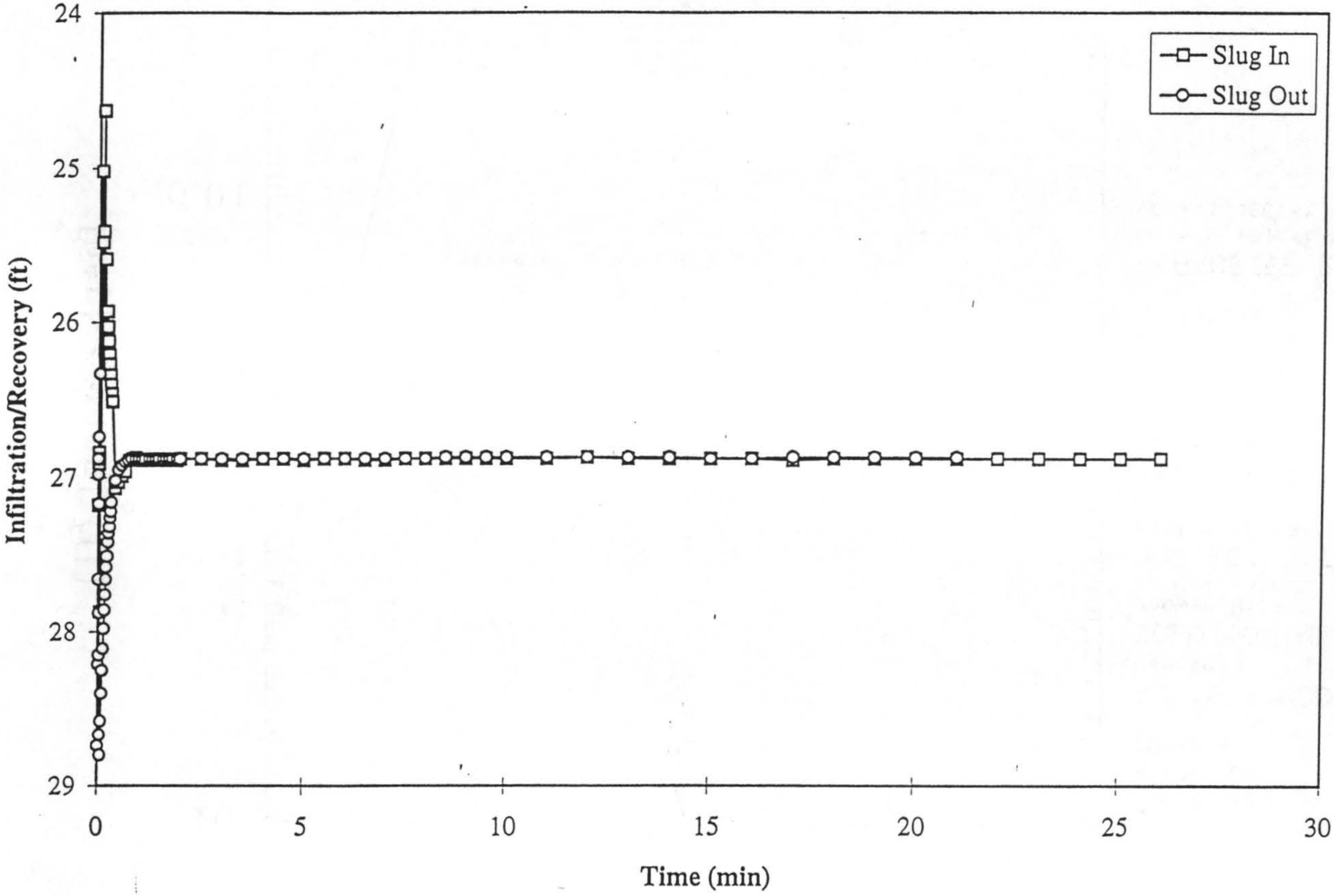

10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
0.25
0.5
0.75
1.
Time (min)
DATA SET:
MW29SI.DAT
10/23/97
AQUIFER MODEL:
Confined
SOLUTION METHOD:
Bouwer-Rice
PROJECT DATA:
test date: 8/16/97
TEST DATA:
H0 = 2.31 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 10.43 ft
H = 10.43 ft
PARAMETER ESTIMATES:
K = 0.1391 ft/min
y0 = 2.955 ft
AQTESOLV



10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
0.25
0.5
0.75
1.
Time (min)
DATA SET:
MW29SO.DAT
10/23/97
AQUIFER MODEL:
Confined
SOLUTION METHOD:
Bouwer-Rice
PROJECT DATA:
test date: 8/16/97
TEST DATA:
H0 = 1.48 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 10.43 ft
H = 10.43 ft
PARAMETER ESTIMATES:
K = 0.131 ft/min
y0 = 1.486 ft

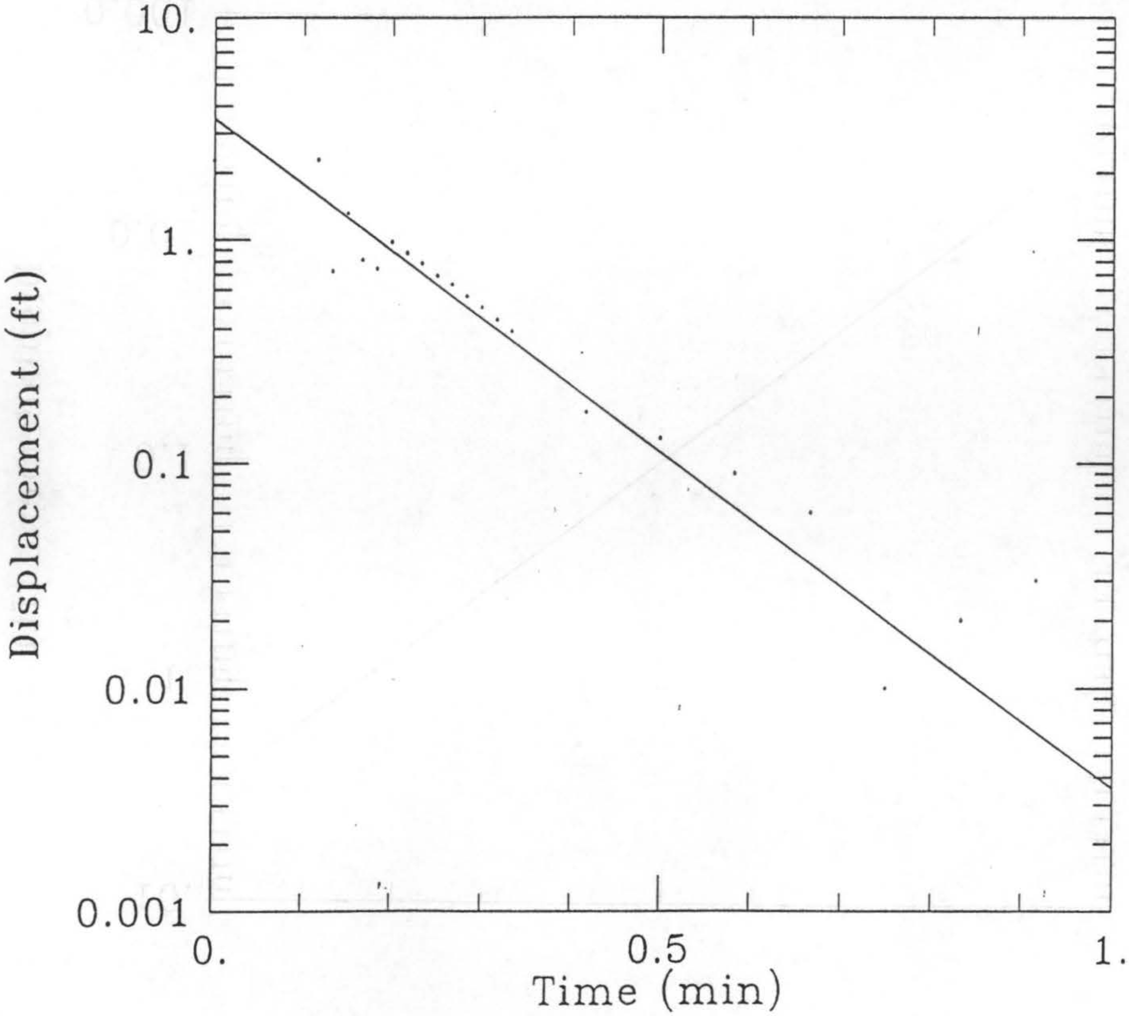
AQTESOLV

MW-30S
~~P-24S Slug Test~~



000425
12/5/97

496



DATA SET:
P24SSI.DAT MW-30S
09/21/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

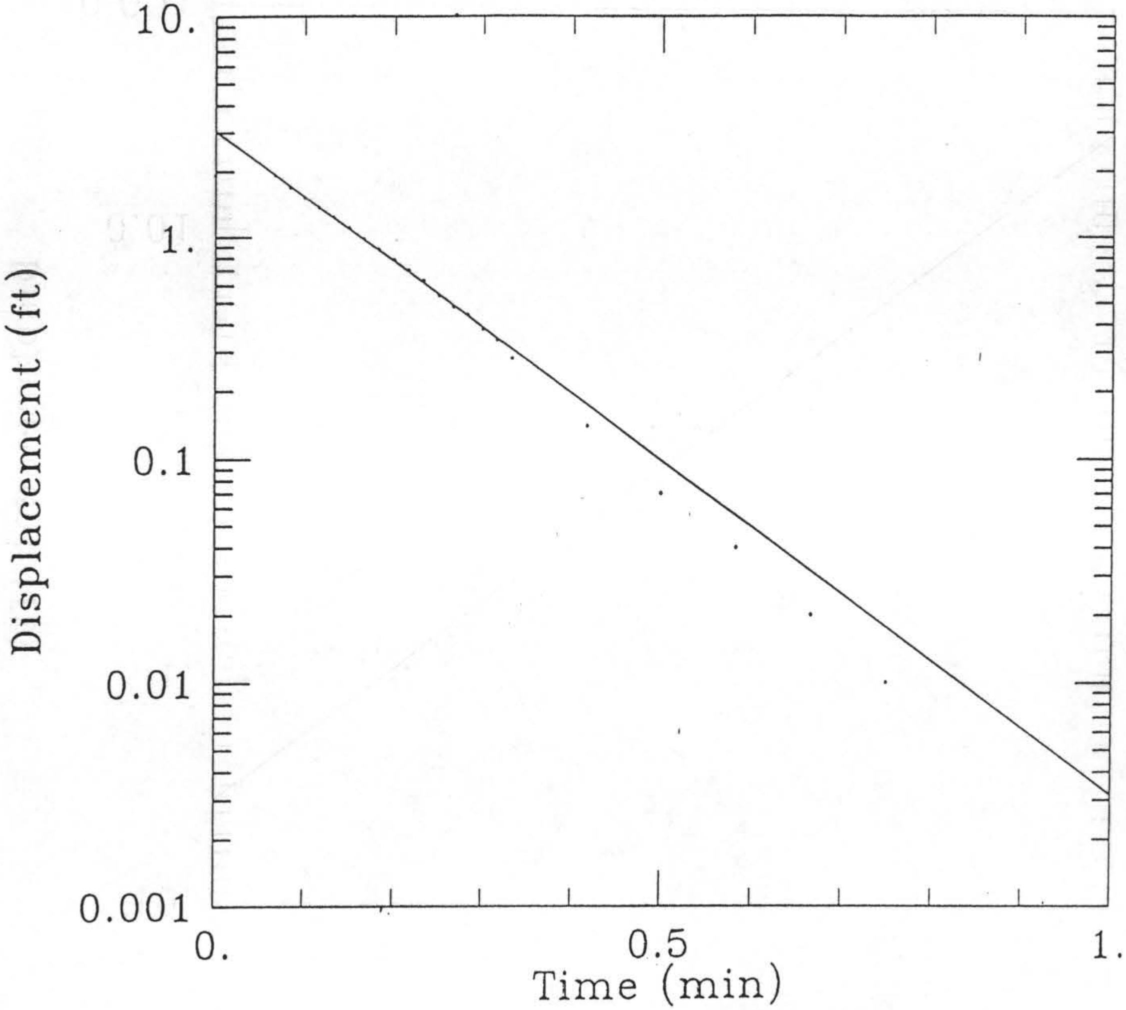
PROJECT DATA:
test date: 8/9/95

TEST DATA:
H0 = 2.27 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 36. ft
H = 11. ft

PARAMETER ESTIMATES:
K = 0.01977 ft/min
y0 = 3.505 ft

AQTESOLV

0000426
JL 12/19/97



DATA SET:
P24SSO.DAT MW-30S
09/21/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/9/95

TEST DATA:
H0 = 1.92 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 36. ft
H = 11. ft

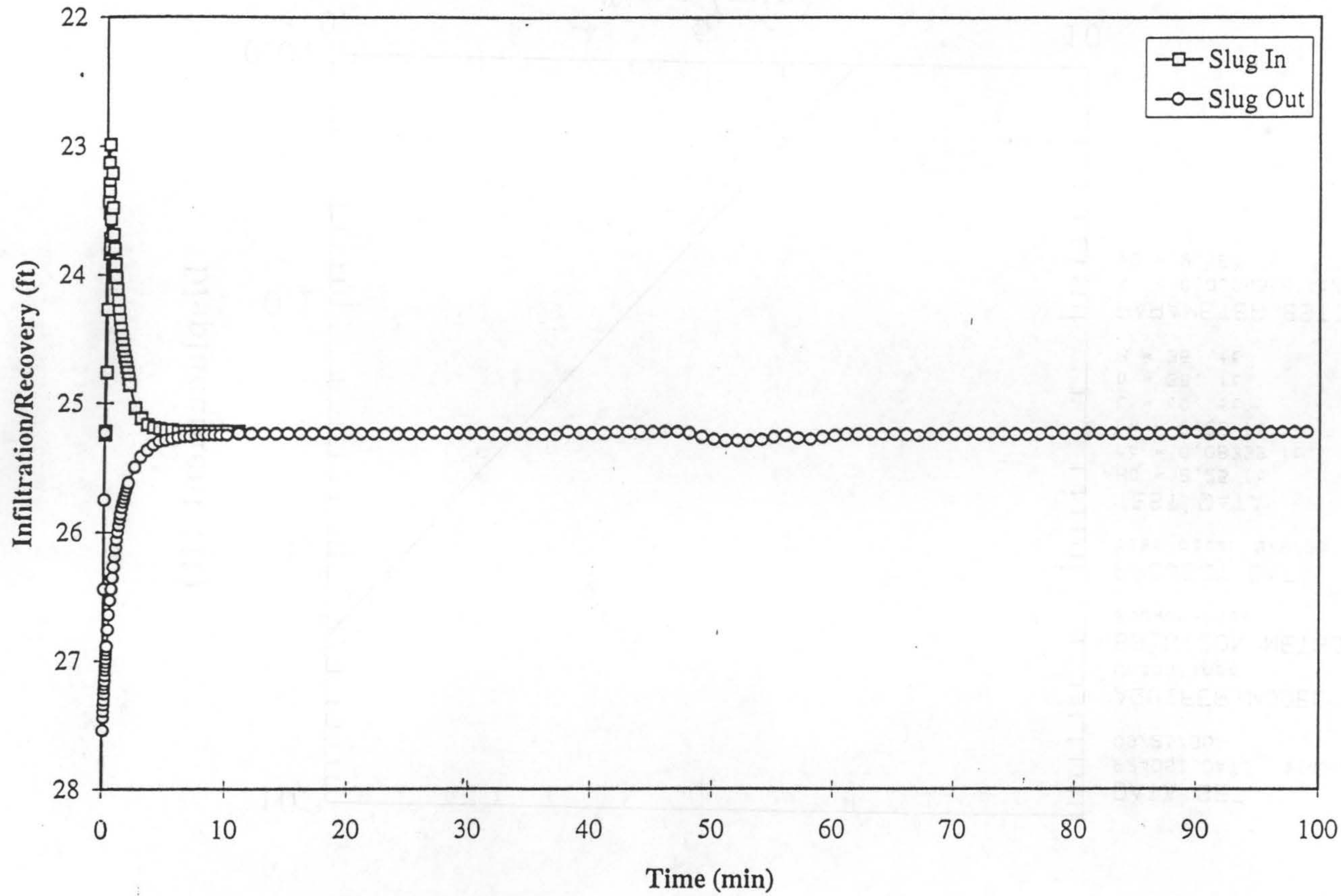
PARAMETER ESTIMATES:
K = 0.01973 ft/min
y0 = 3.044 ft

AQTESOLV

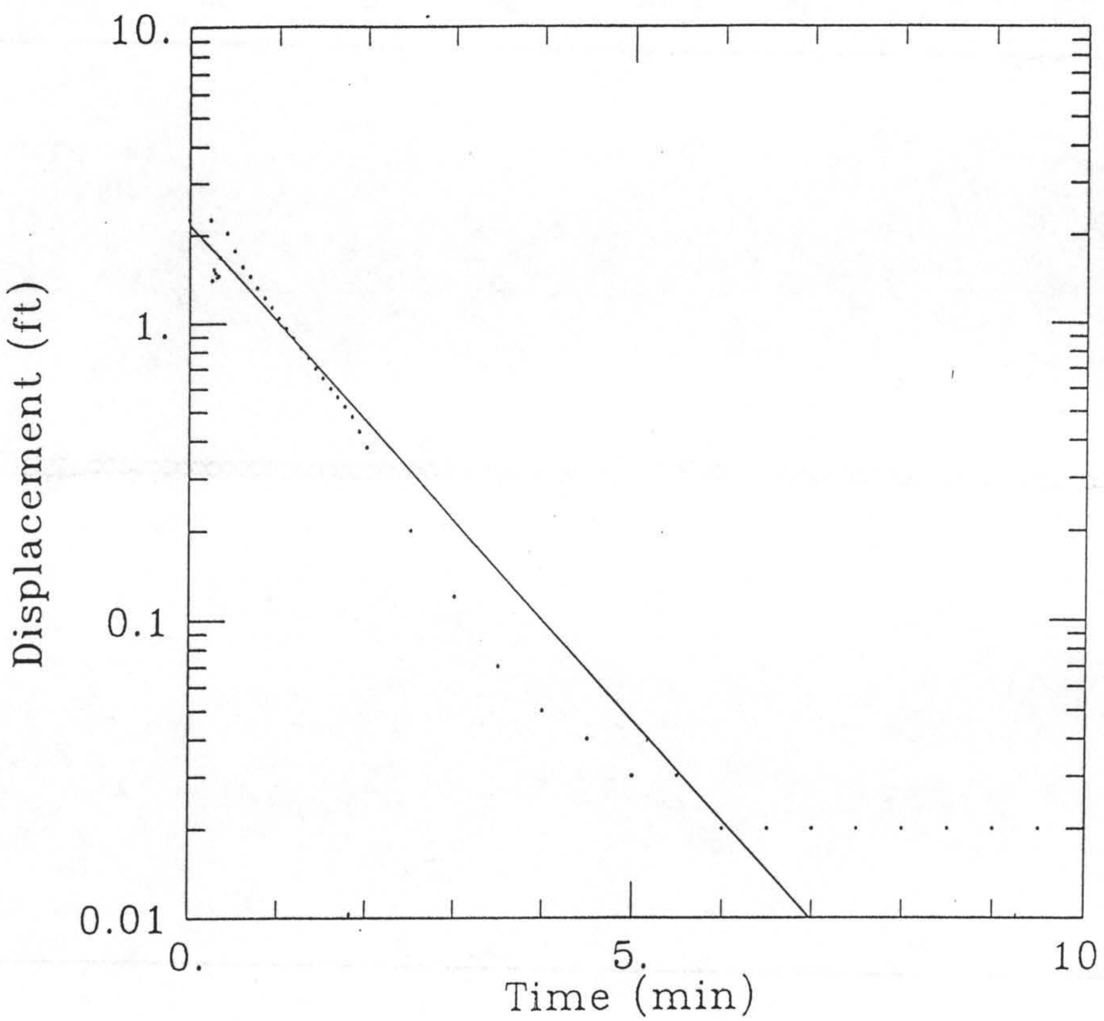
0004227

MW-30D (JH) 12/19/97

~~P-24D~~ Slug Test



499



DATA SET:
P24DSI.DAT Mw-30D
09/21/95

AQUIFER MODEL:
Unconfined

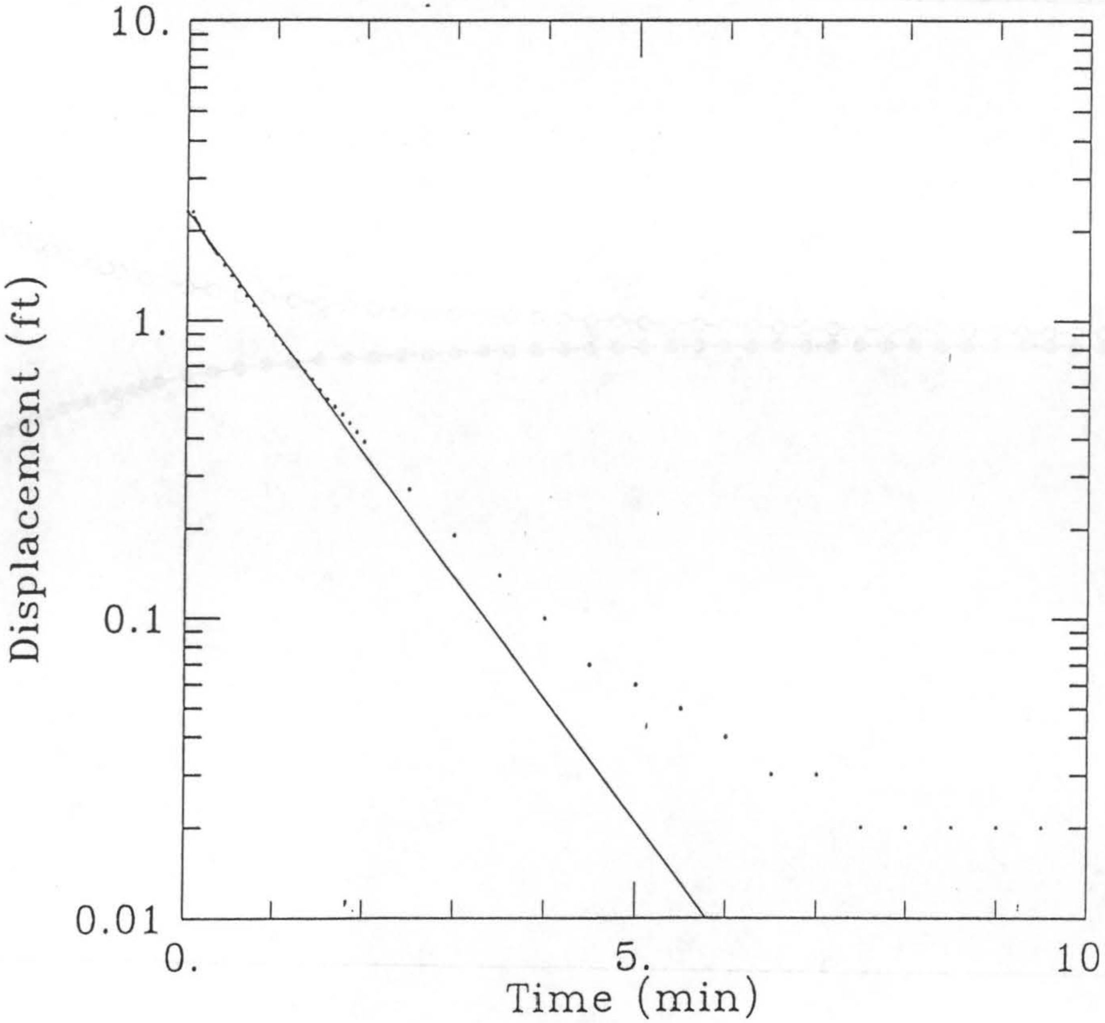
SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/9/95

TEST DATA:
H0 = 2.25 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 36. ft
H = 36. ft

PARAMETER ESTIMATES:
K = 0.0009596 ft/min
y0 = 2.161 ft

AQTESOLV



DATA SET:
P24DSO.DAT MW-30D
09/21/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/9/95

TEST DATA:
H0 = 2.31 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 36. ft
H = 36. ft

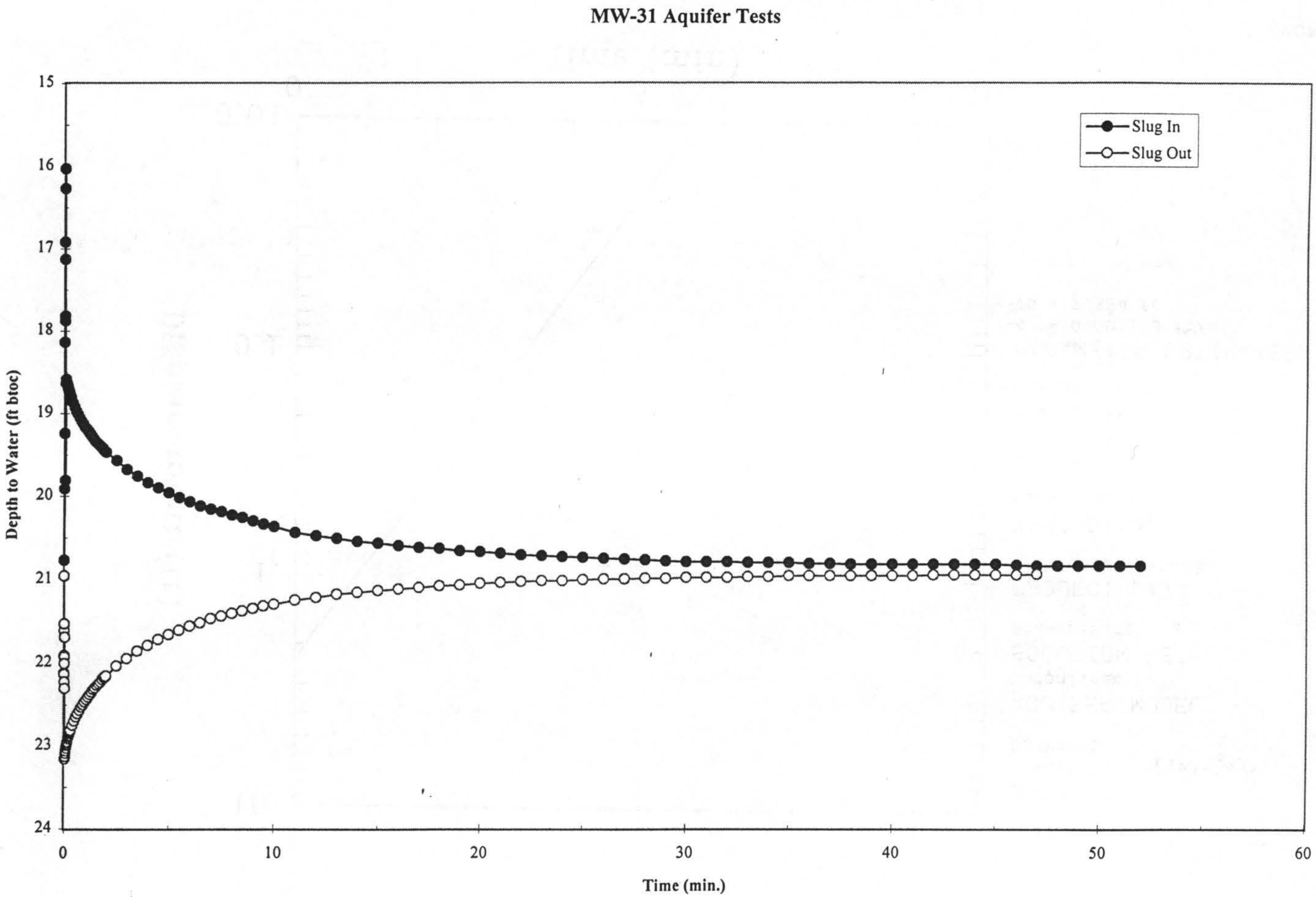
PARAMETER ESTIMATES:
K = 0.001173 ft/min
y0 = 2.324 ft

AQTESOLV

000430

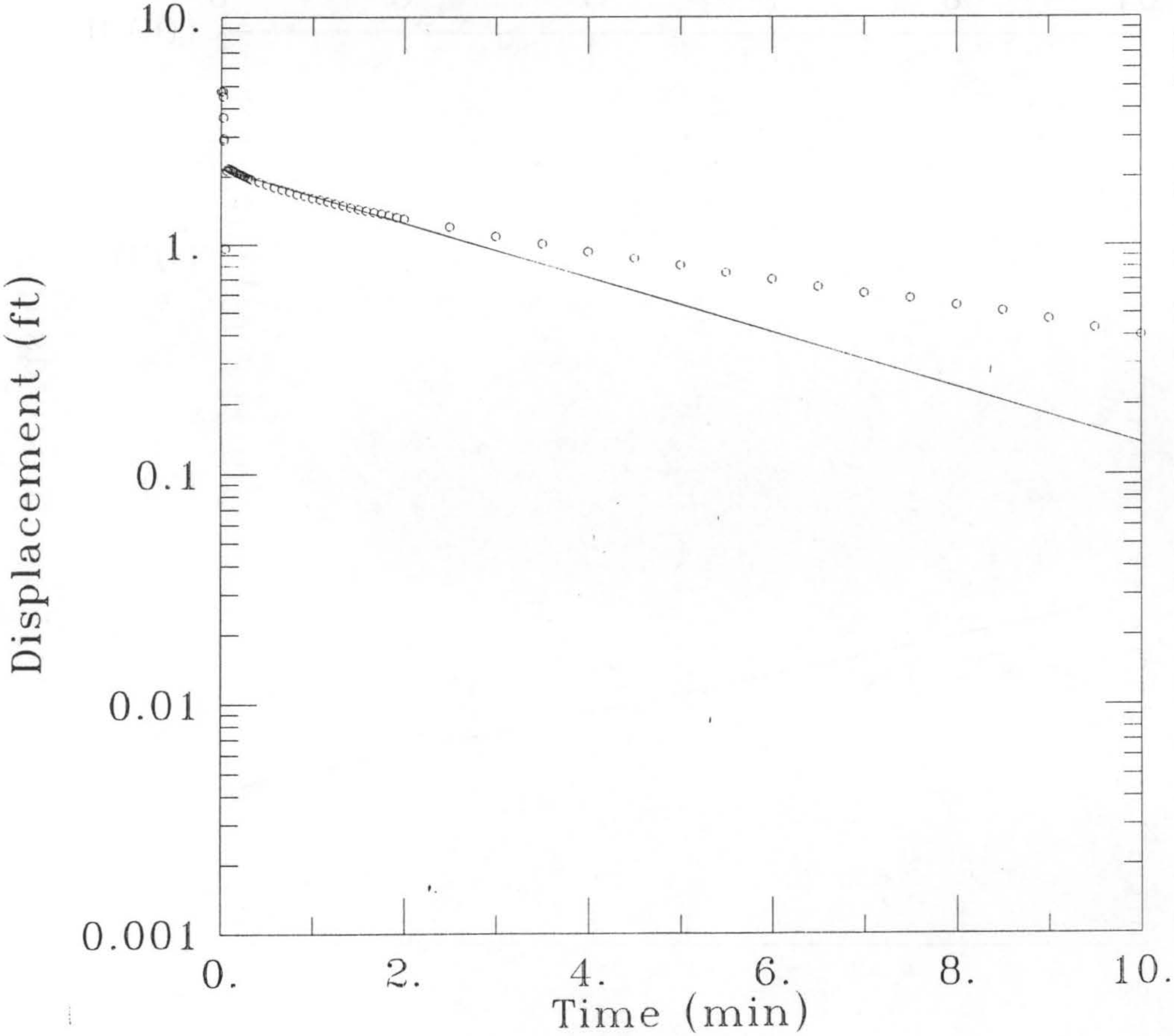
JH 12/15/97

501



MW-31 Aquifer Tests
Slug In
Slug Out
Depth to Water (ft btoc)
Time (min.)
15
16
17
18
19
20
21
22
23
24
0
10
20
30
40
50
60

502



DATA SET:
MW31SI.DAT
10/23/97

AQUIFER MODEL:
Unconfined

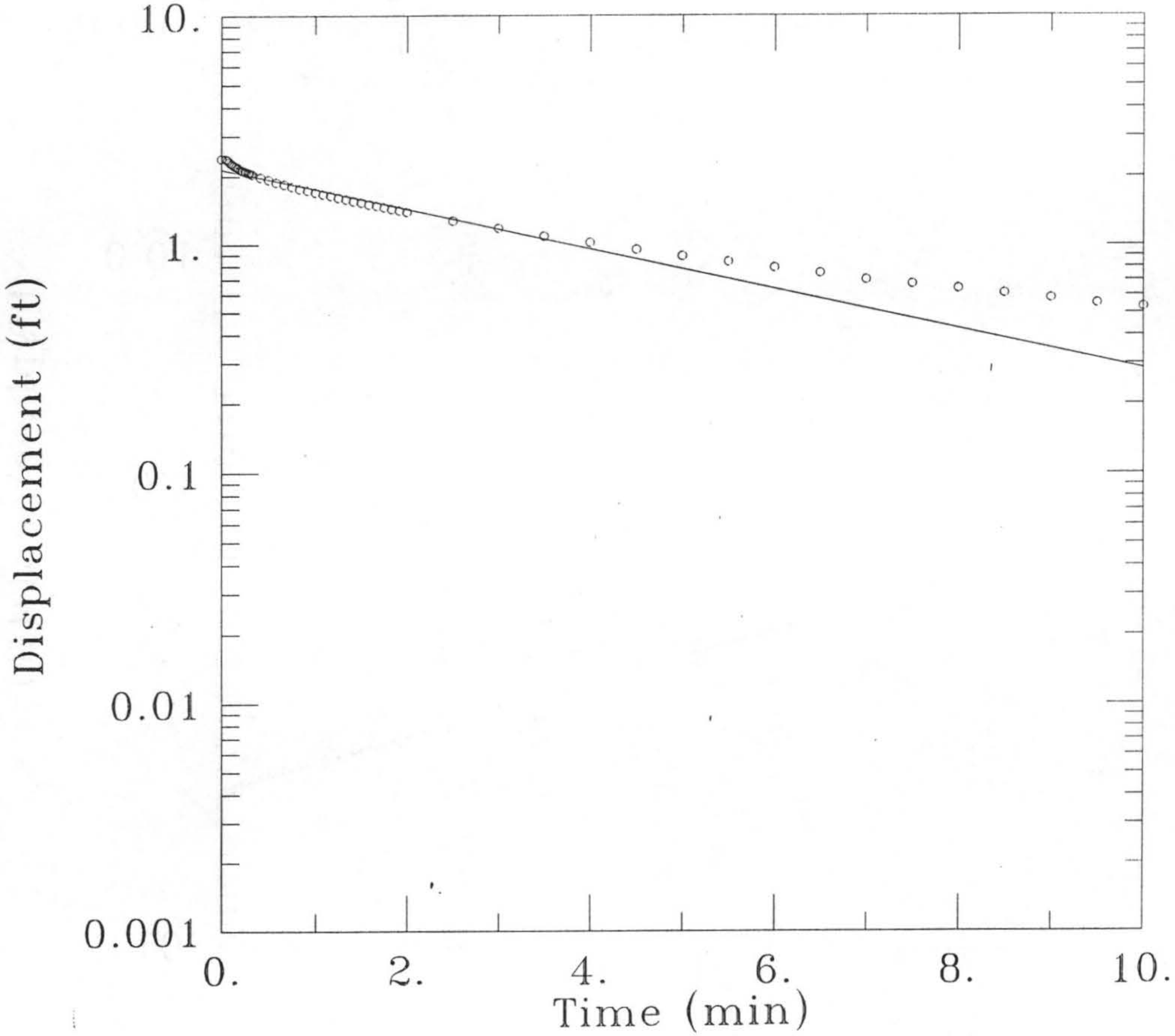
SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/17/97

TEST DATA:
H0 = 4.74 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 28.53 ft
H = 28.53 ft

PARAMETER ESTIMATES:
K = 0.000331 ft/min
y0 = 2.163 ft

AQTESOLV



DATA SET:
MW31SO.DAT
10/23/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/17/97

TEST DATA:
H0 = 2.39 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 28.53 ft
H = 28.53 ft

PARAMETER ESTIMATES:
K = 0.0002417 ft/min
y0 = 2.144 ft

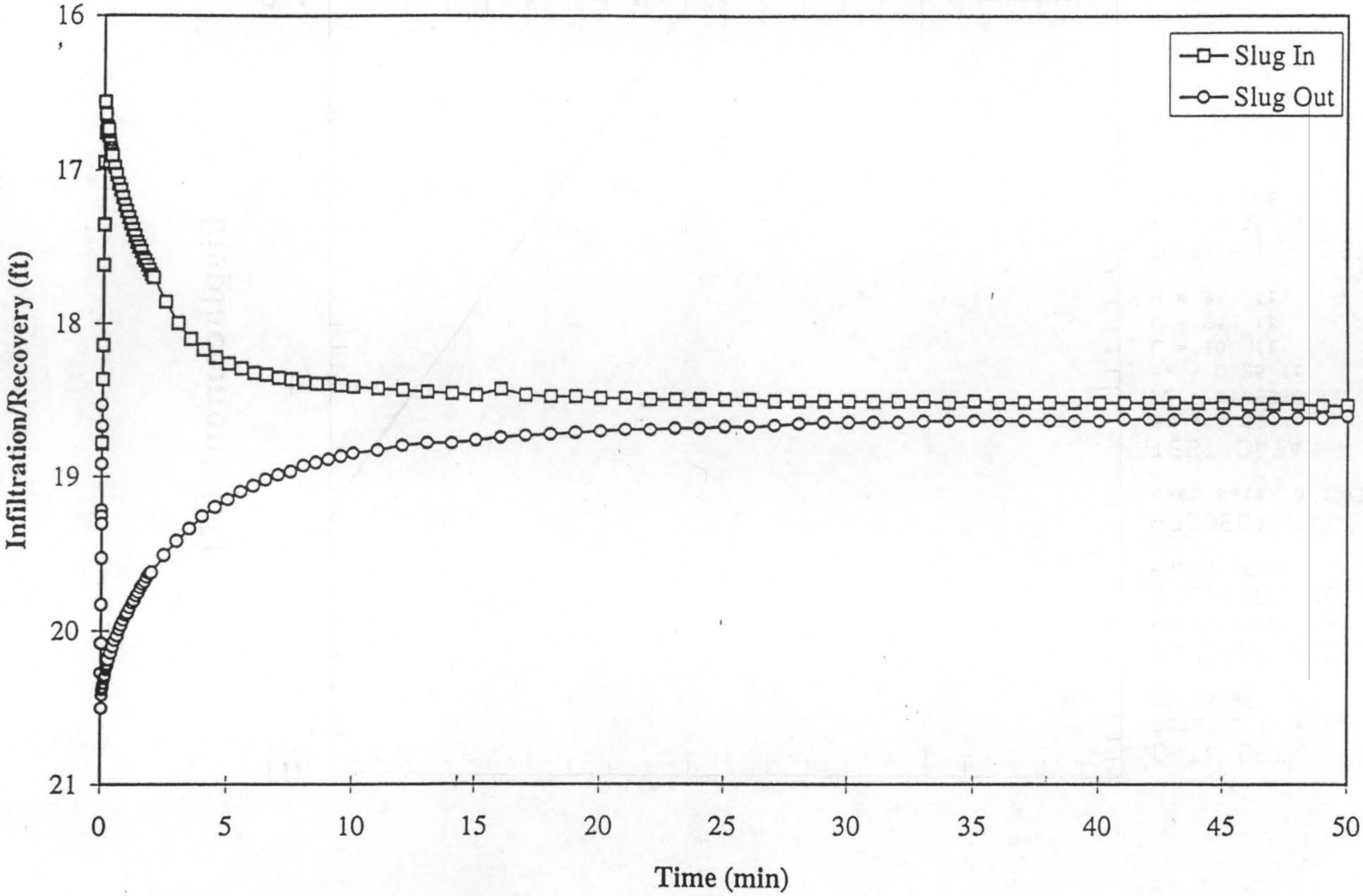
AQTESOLV

graph

MW-32

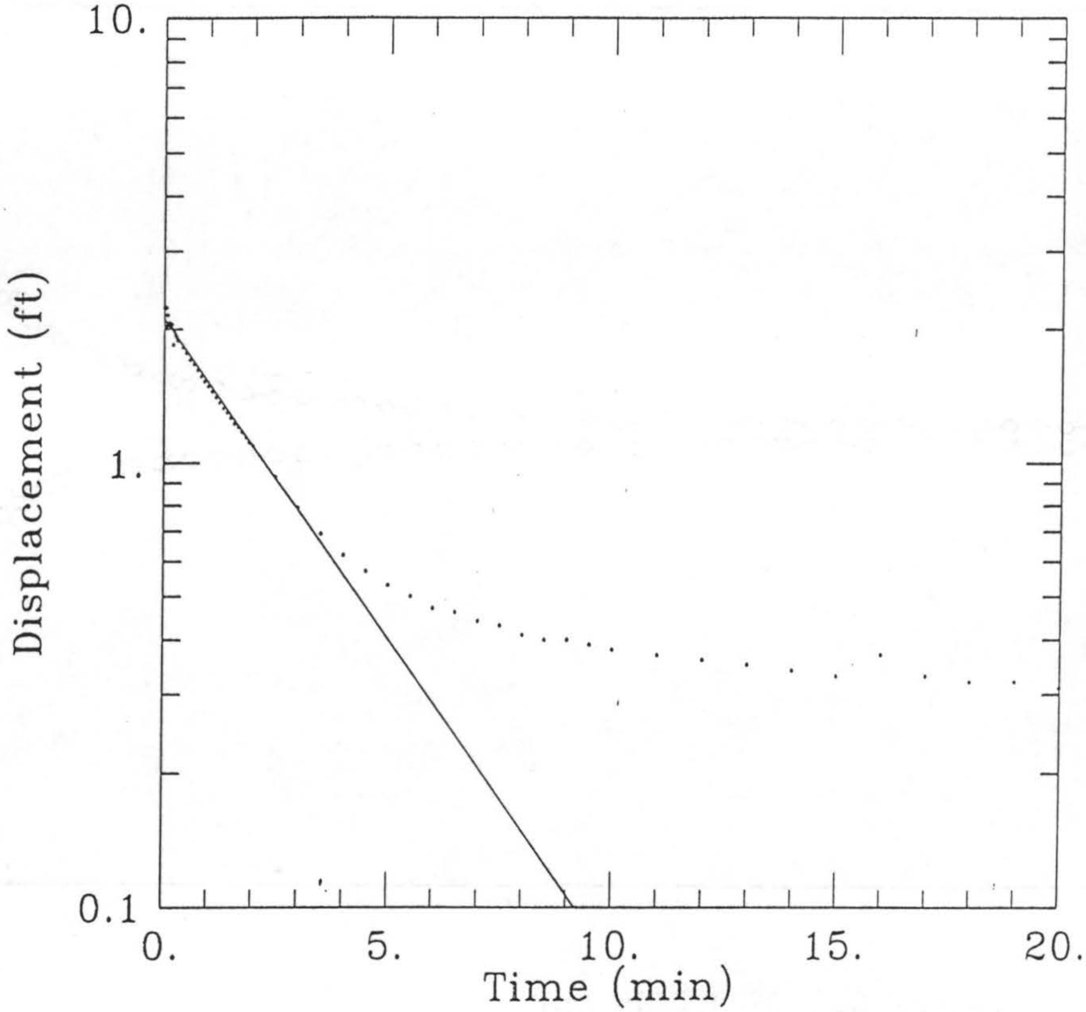
~~P-7~~ Slug Test

JH 12/19/97



~~0003274~~ JH 12/19/97

505



DATA SET:
P07SI.DAT rw-32
09/25/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/10/95

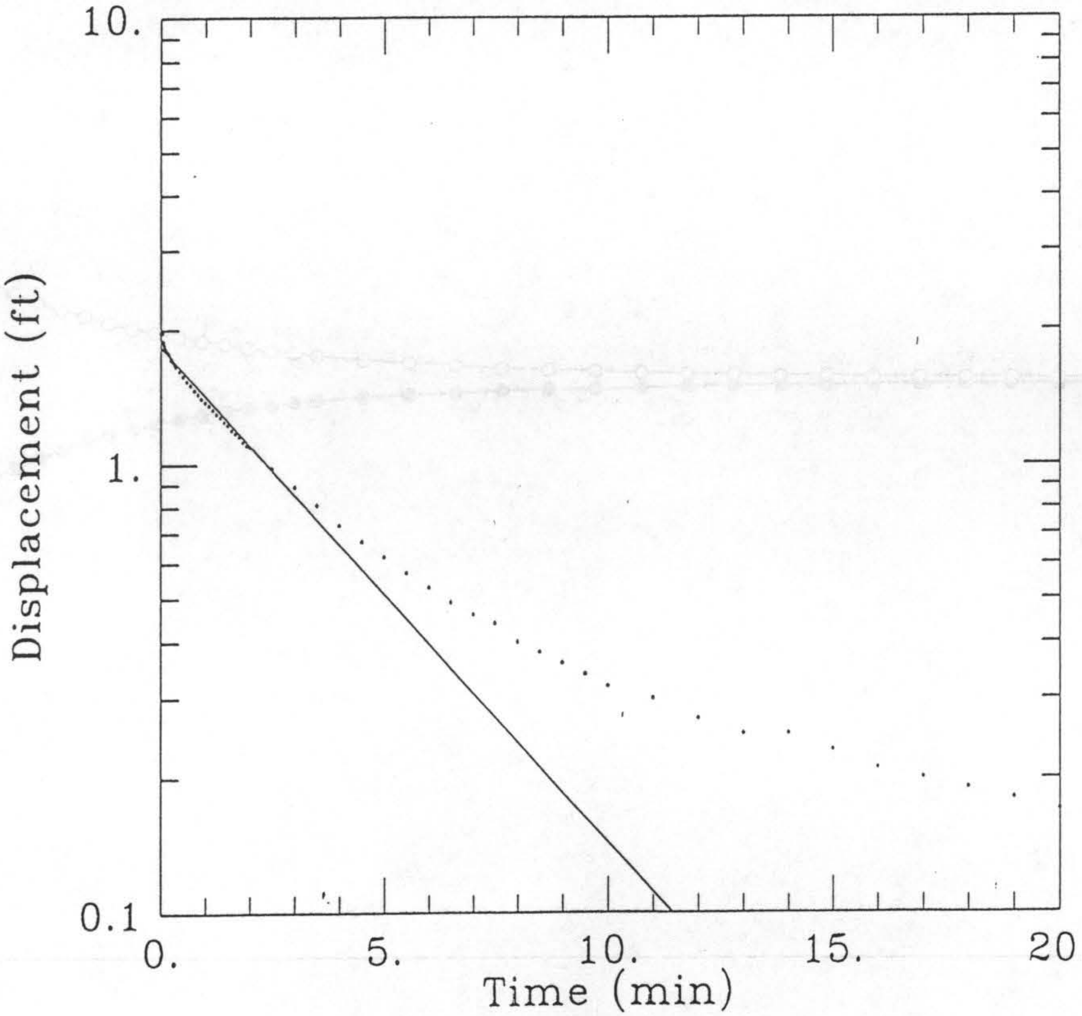
TEST DATA:
H0 = 2.23 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 31. ft
H = 31. ft

PARAMETER ESTIMATES:
K = 0.0004025 ft/min
y0 = 2.106 ft

AQTESOLV

000375
12/15/97

506



DATA SET:
P07SO.DAT Mw-32
09/25/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/10/95

TEST DATA:
H0 = 1.97 ft
rc = 0.08333 ft
rw = 0.25 ft
L = 10. ft
b = 31. ft
H = 31. ft

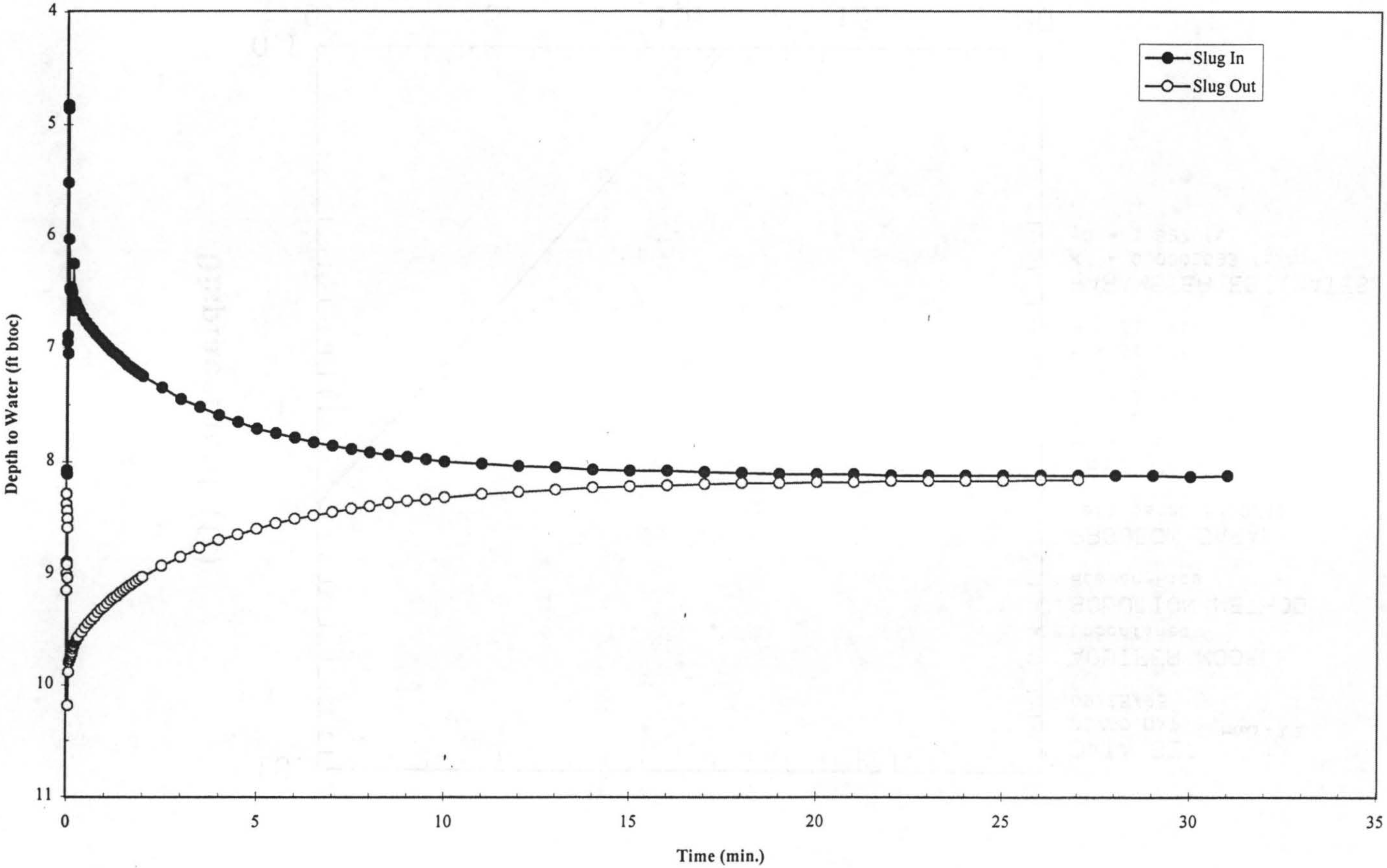
PARAMETER ESTIMATES:
K = 0.0003093 ft/min
y0 = 1.827 ft

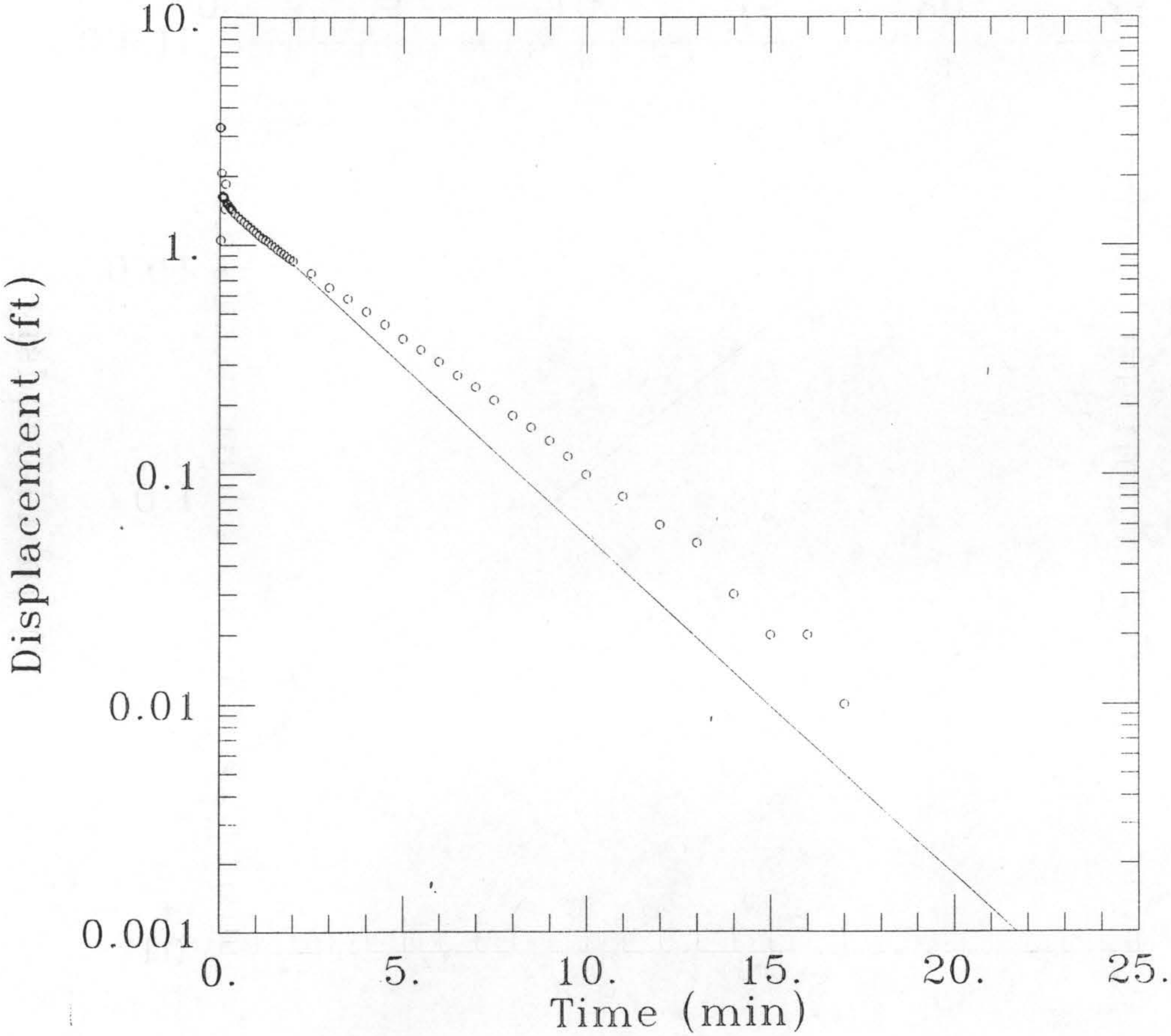
AQTESOLV

0003796
12/12/97

507

MW-33A Aquifer Tests





DATA SET:
MW33ASI.DAT
10/23/97

AQUIFER MODEL:
Confined

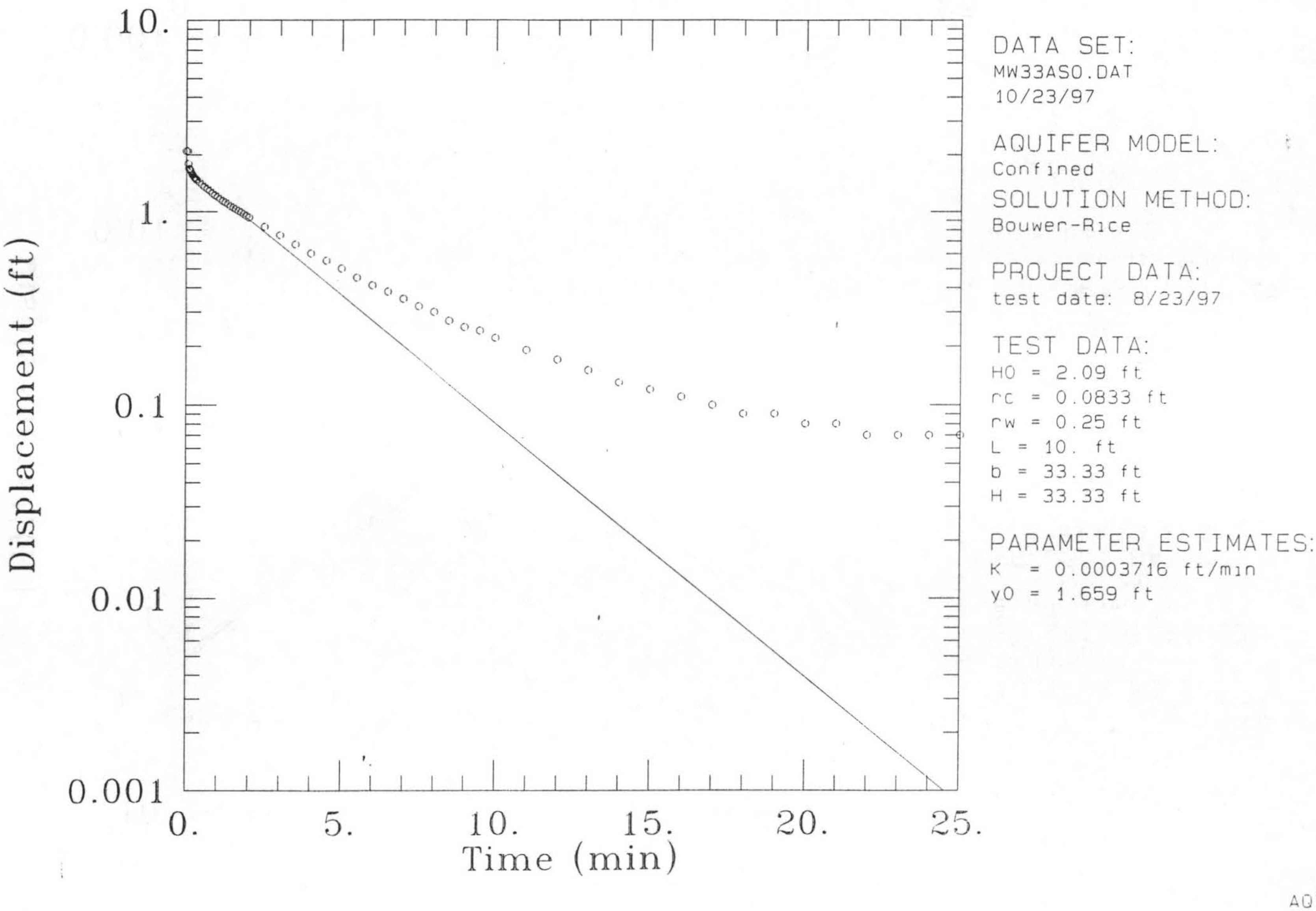
SOLUTION METHOD:
Bouwer-Rice

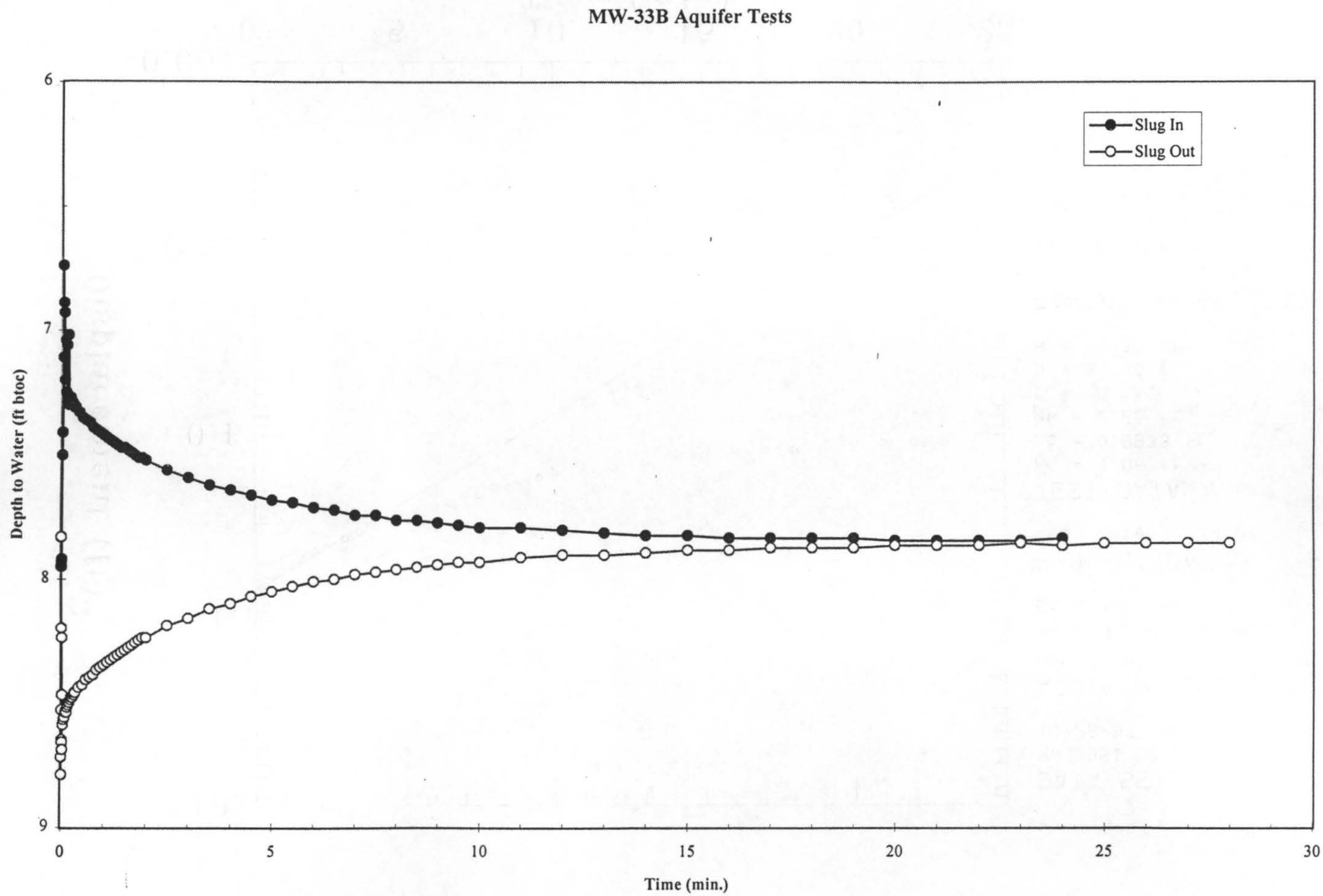
PROJECT DATA:
test date: 8/23/97

TEST DATA:
H0 = 3.27 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 33.33 ft
H = 33.33 ft

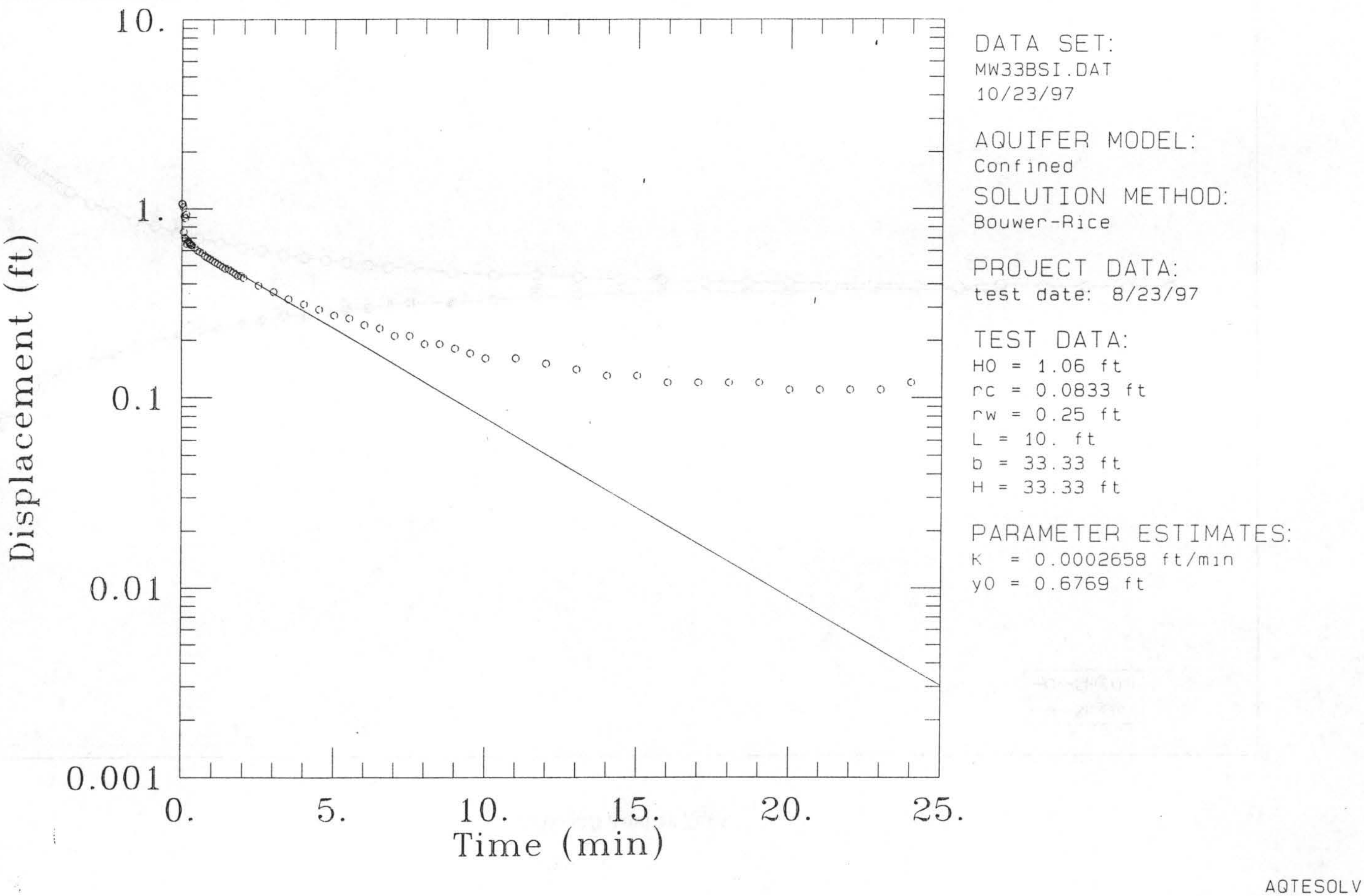
PARAMETER ESTIMATES:
K = 0.000419 ft/min
y0 = 1.628 ft

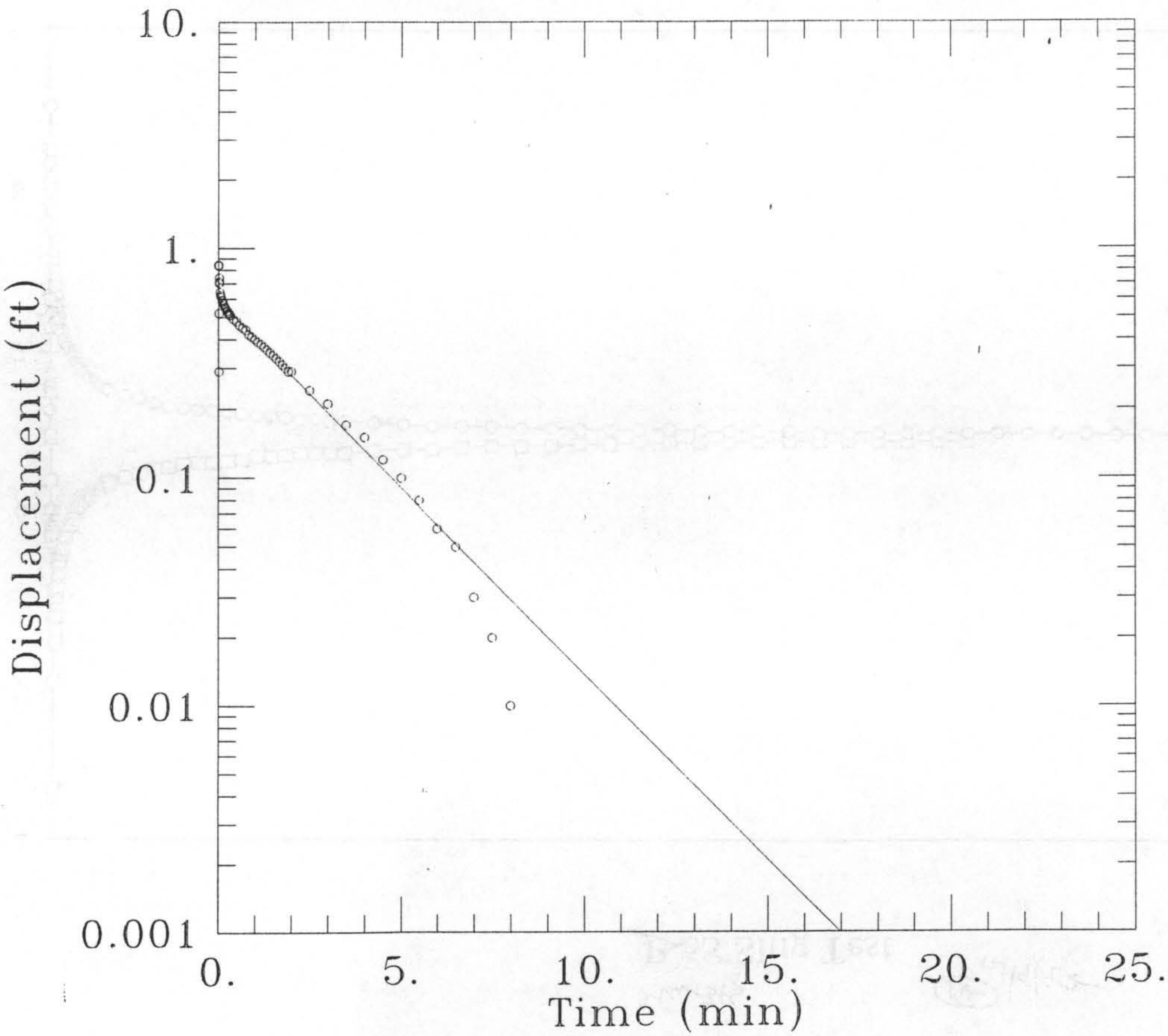
AQTESOLV


10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
5.
10.
15.
20.
25.
Time (min)
DATA SET:
MW33AS0.DAT
10/23/97
AQUIFER MODEL:
Confined
SOLUTION METHOD:
Bouwer-Rice
PROJECT DATA:
test date: 8/23/97
TEST DATA:
H0 = 2.09 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 33.33 ft
H = 33.33 ft
PARAMETER ESTIMATES:
K = 0.0003716 ft/min
y0 = 1.659 ft
AQTESOLV


MW-33B Aquifer Tests
Slug In
Slug Out
Depth to Water (ft btoc)
Time (min.)
6
7
8
9
0
5
10
15
20
25
30

511


10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
5.
10.
15.
20.
25.
Time (min)
DATA SET:
MW33BSI.DAT
10/23/97
AQUIFER MODEL:
Confined
SOLUTION METHOD:
Bouwer-Rice
PROJECT DATA:
test date: 8/23/97
TEST DATA:
H0 = 1.06 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 33.33 ft
H = 33.33 ft
PARAMETER ESTIMATES:
K = 0.0002658 ft/min
y0 = 0.6769 ft
AQTESOLV



DATA SET:
MW33BSO.DAT
10/23/97

AQUIFER MODEL:
Confined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/23/97

TEST DATA:
H0 = 0.84 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 33.33 ft
H = 33.33 ft

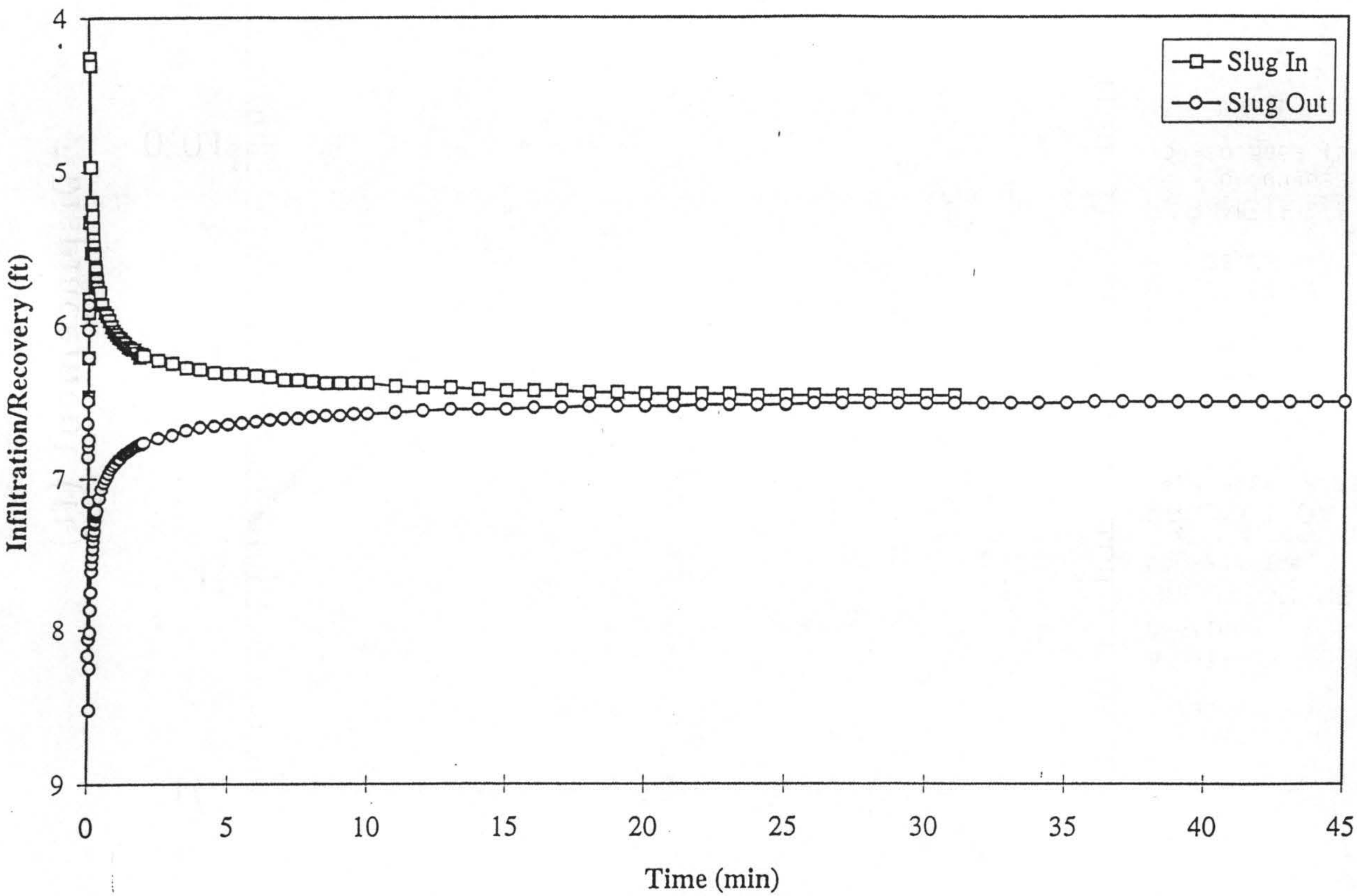
PARAMETER ESTIMATES:
K = 0.0004632 ft/min
y0 = 0.5962 ft

AQTESOLV

MW-34S

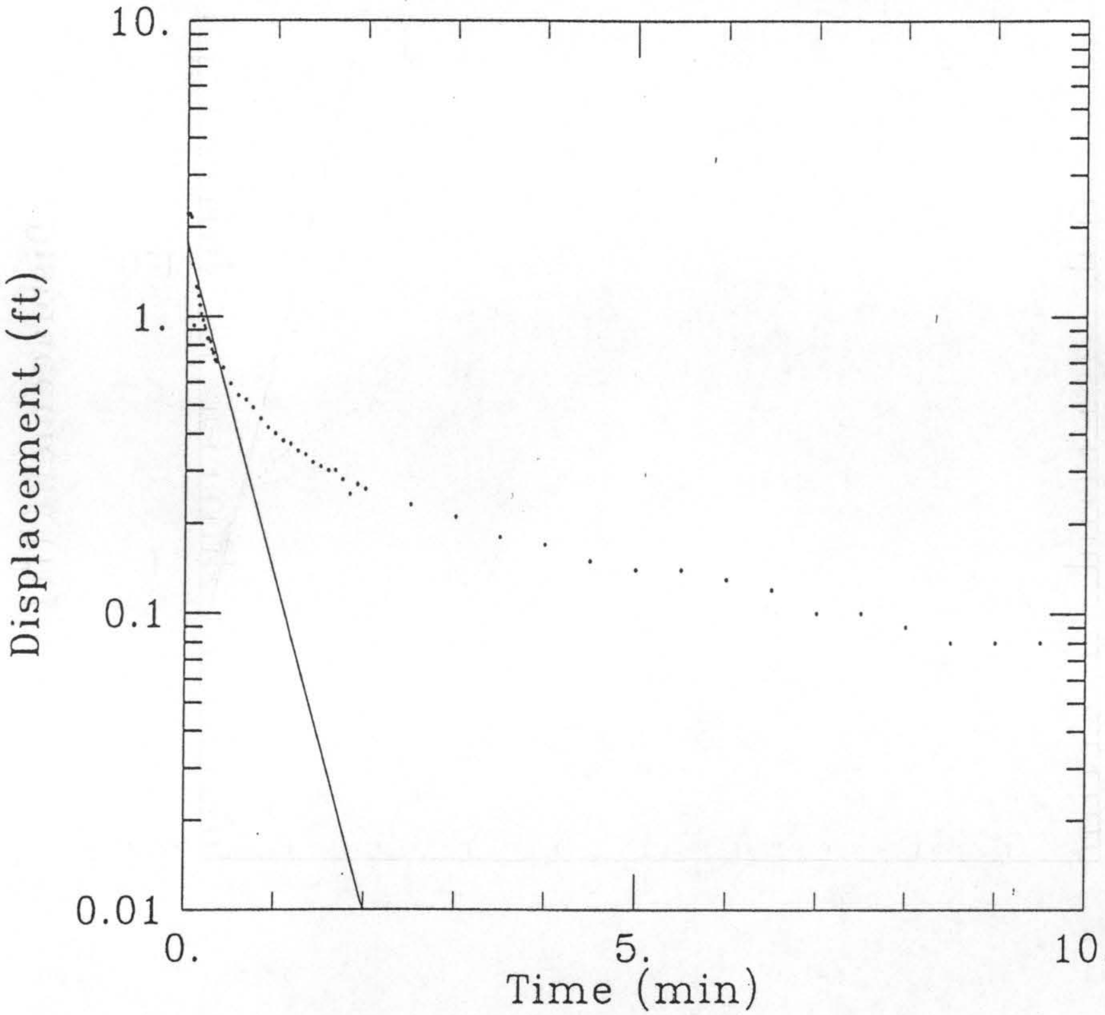
~~P-6S~~ Slug Test

JH 12/19/97



~~000368~~
JH 12/19/97

514



DATA SET:
P06SSIA.DAT MW-34S
09/25/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/10/95

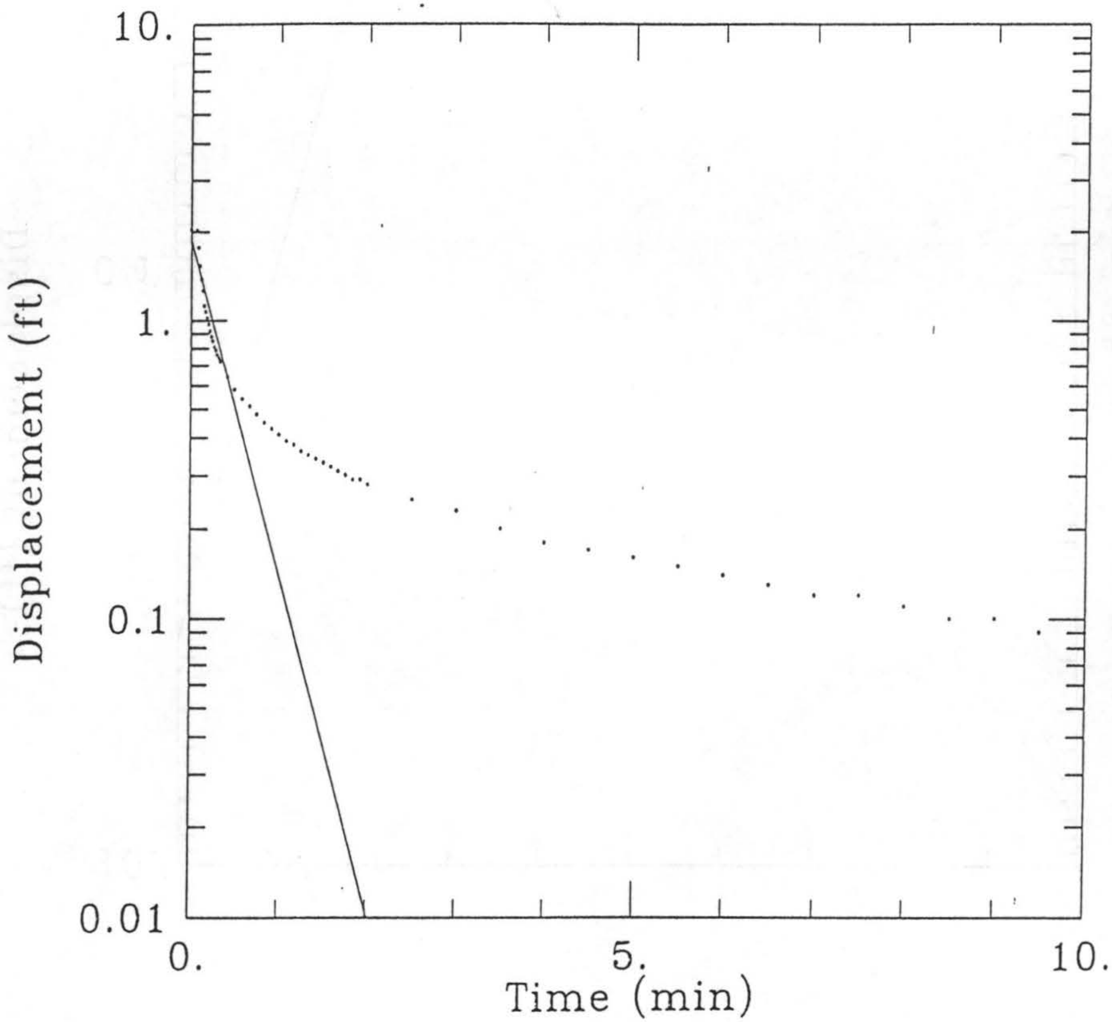
TEST DATA:
H0 = 2.2 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 30. ft
H = 30. ft

PARAMETER ESTIMATES:
K = 0.00314 ft/min
y0 = 1.779 ft

AQTESOLV

~~000369~~

JK 12/19/92



DATA SET:
P06SS0A.DAT MW-34S
09/25/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/10/95

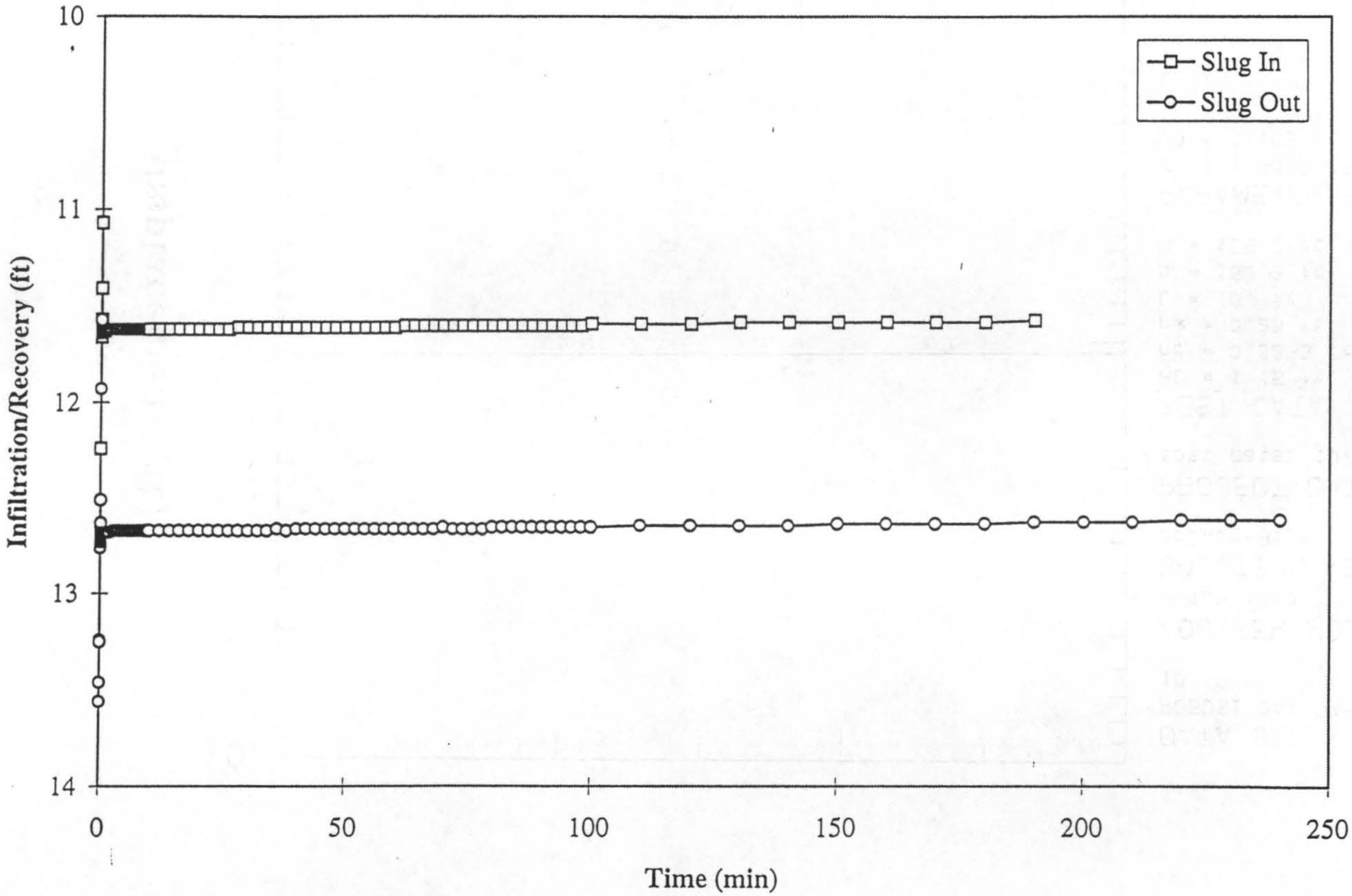
TEST DATA:
H0 = 2.03 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 30. ft
H = 30. ft

PARAMETER ESTIMATES:
K = 0.003127 ft/min
y0 = 1.864 ft

AQTESOLV

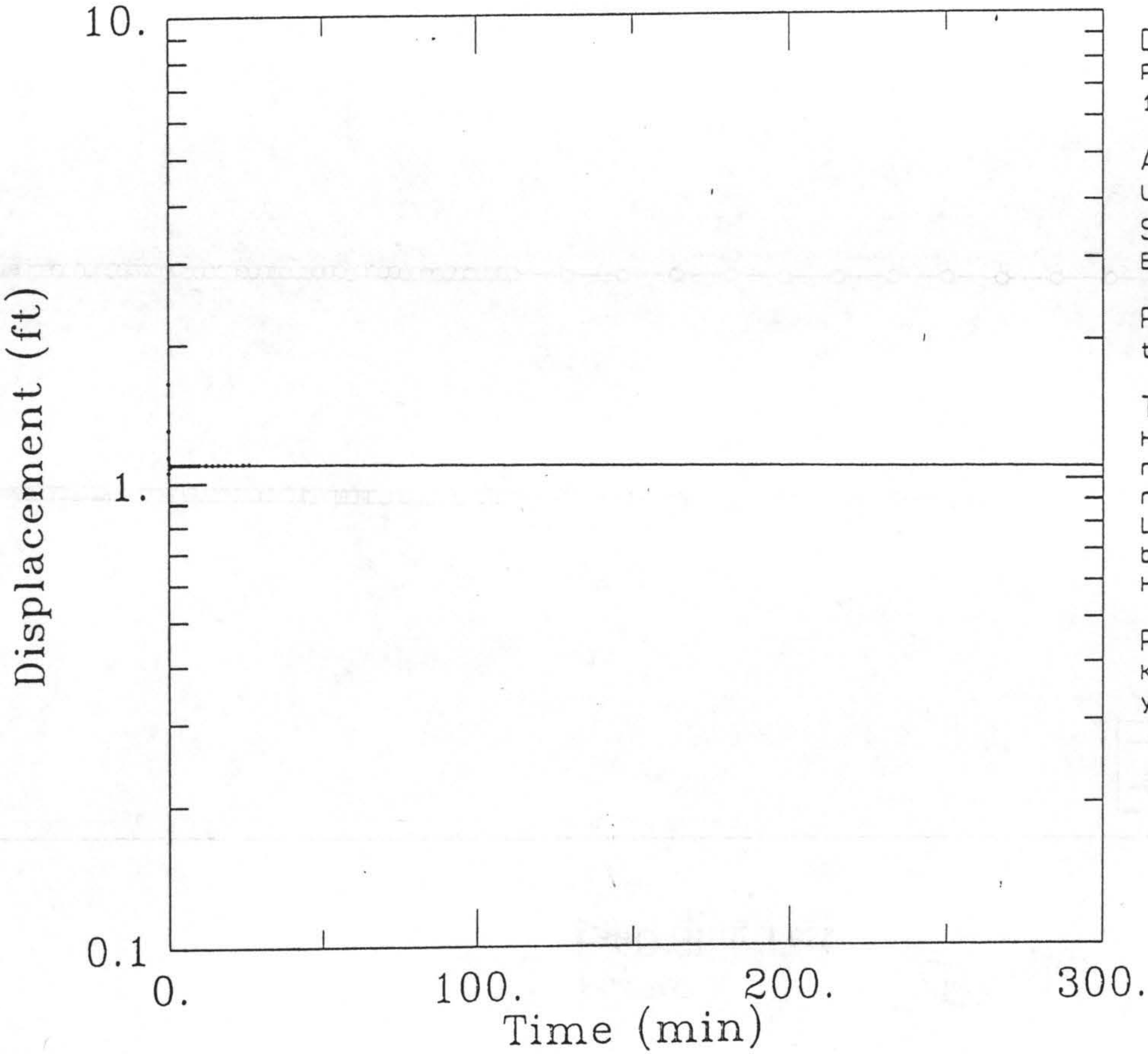
MW-34D JH 12/19/97

~~P-6D~~ Slug Test



~~000371~~ JH 12/22/97

517



DATA SET:
P06DSI.DAT MW-34D
10/18/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

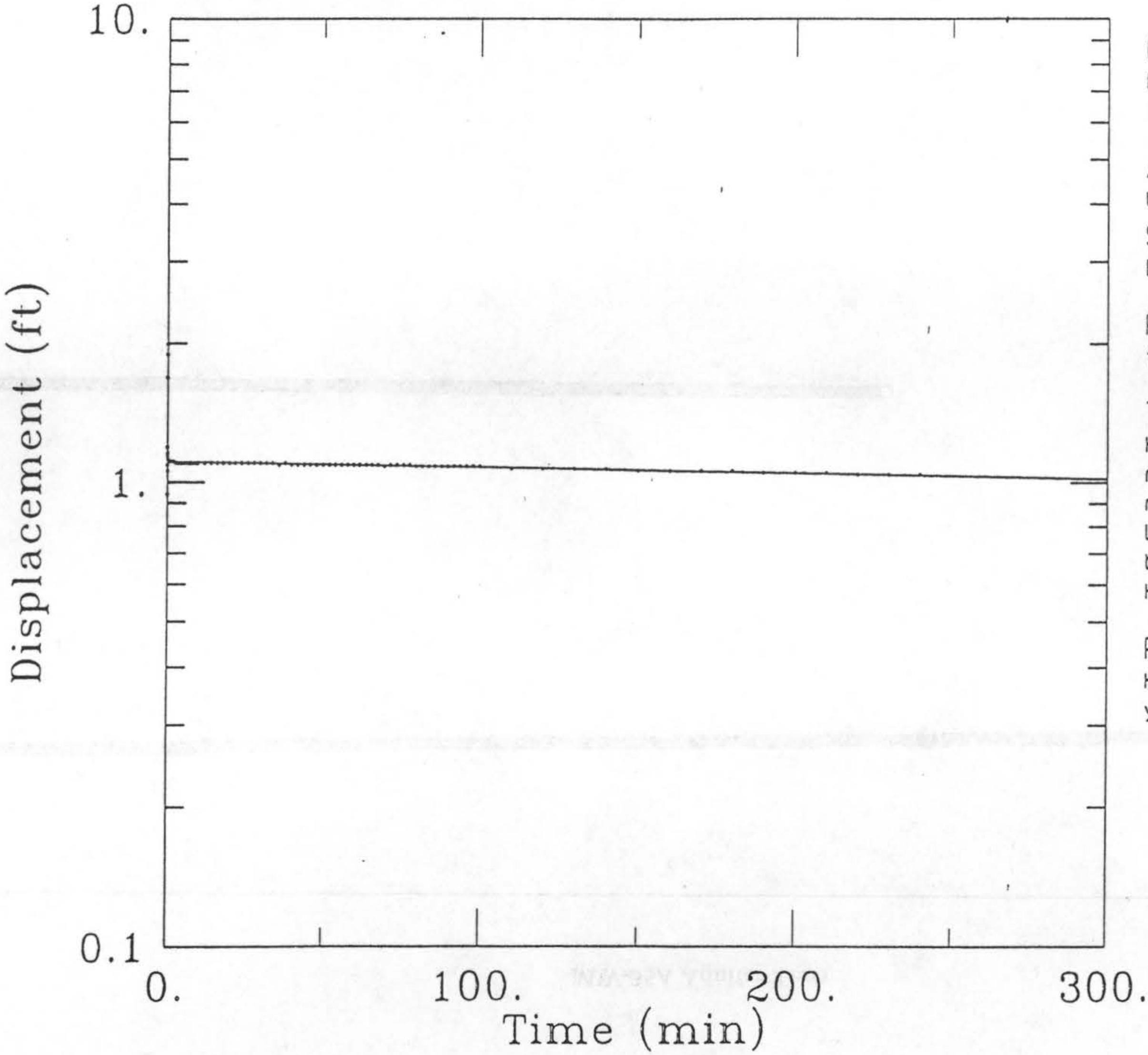
PROJECT DATA:
test date: 10/14/95

TEST DATA:
H0 = 1.15 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 169.3 ft
H = 169.3 ft

PARAMETER ESTIMATES:
K = 1.905E-07 ft/min
y0 = 1.102 ft

AQTESOLV

000372



DATA SET:
P06DSO.DAT MW-34D
10/18/95

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 10/14/95

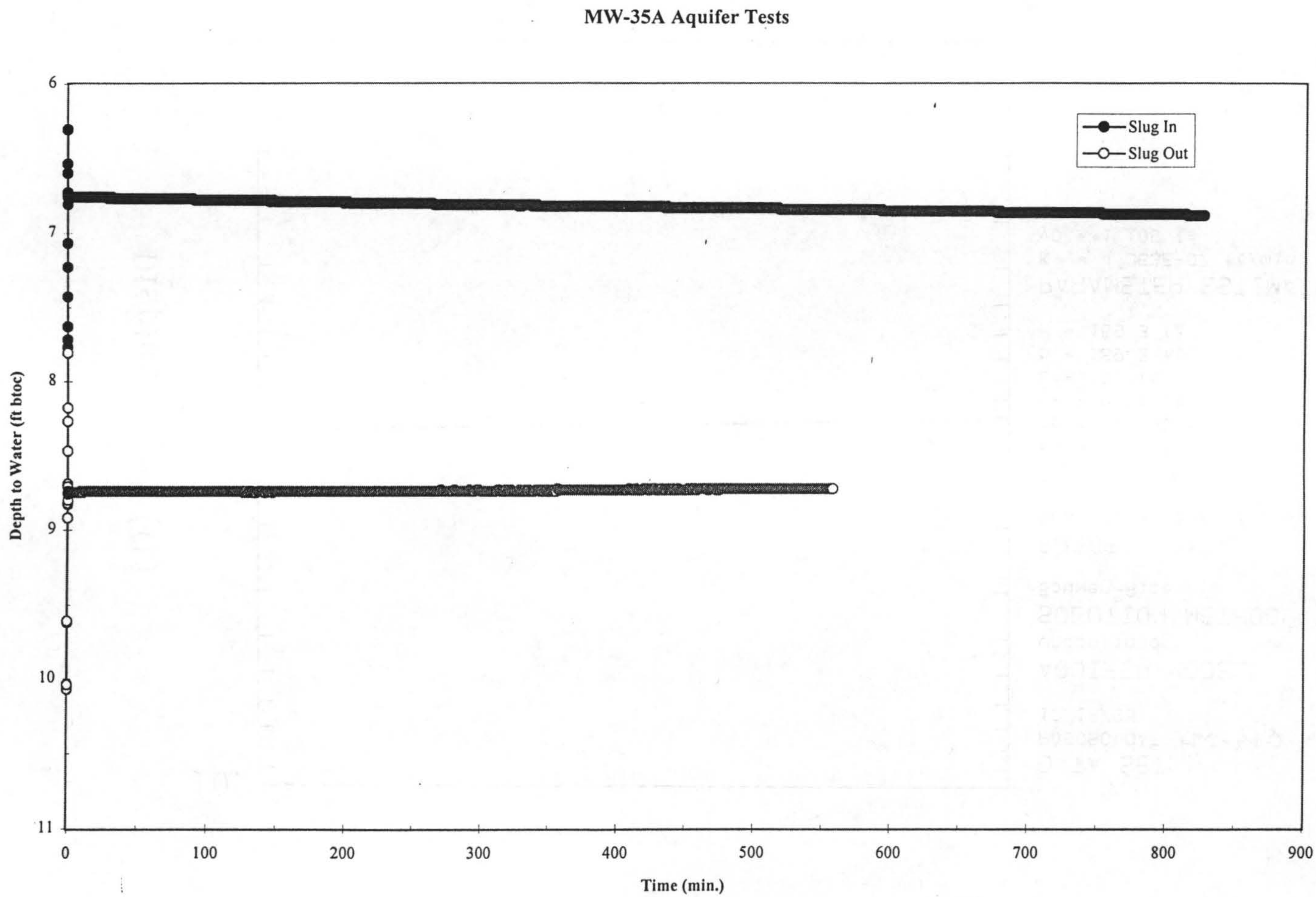
TEST DATA:
H0 = 1.19 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 169.3 ft
H = 169.3 ft

PARAMETER ESTIMATES:
K = 4.363E-07 ft/min
y0 = 1.109 ft

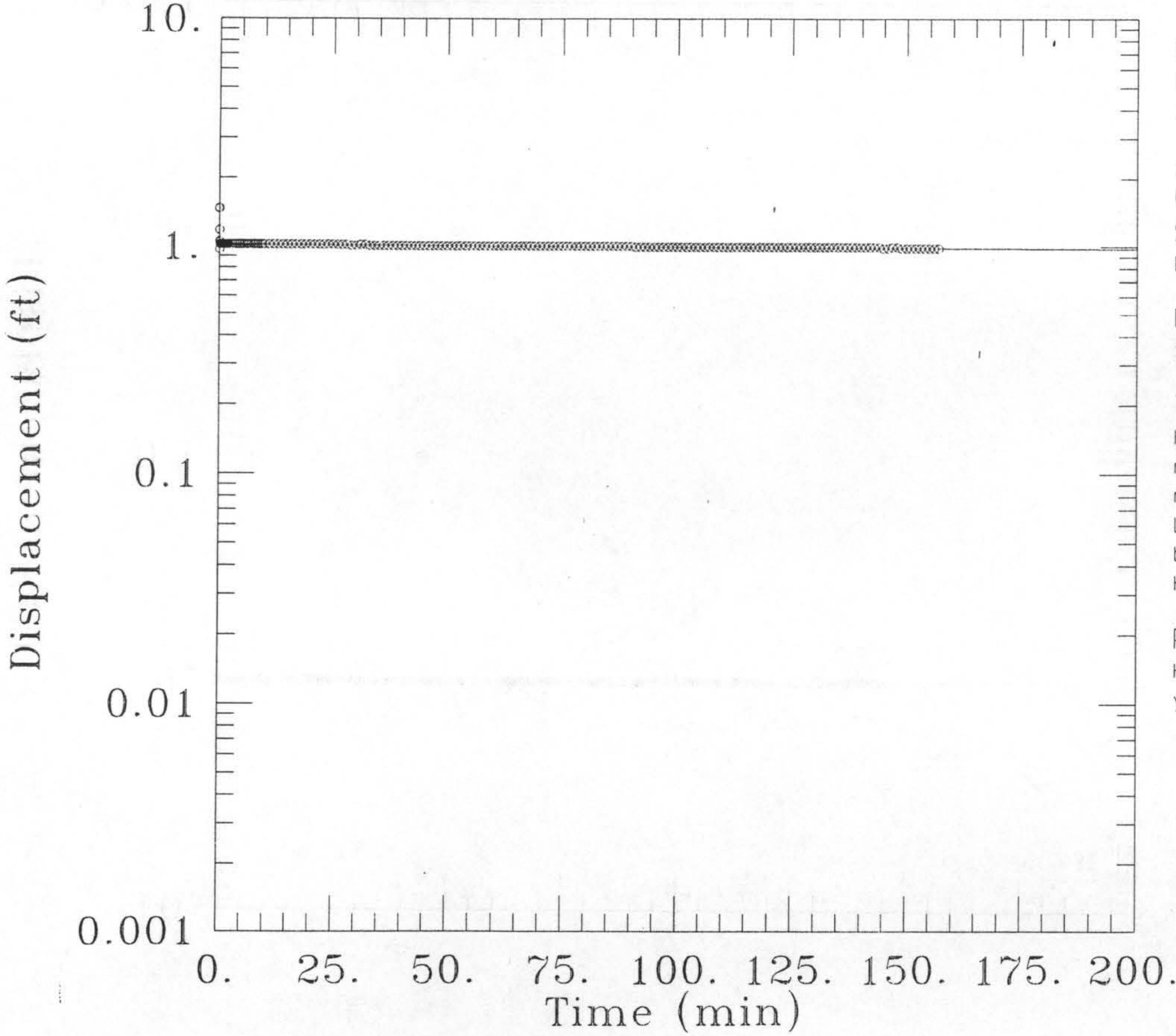
AQTESOLV

~~000373~~ 12/19/97

519



MW-35A Aquifer Tests
Slug In
Slug Out
Depth to Water (ft btoc)
Time (min.)
6
7
8
9
10
11
0
100
200
300
400
500
600
700
800
900



DATA SET:
MW35SI.DAT
10/23/97

AQUIFER MODEL:
Confined

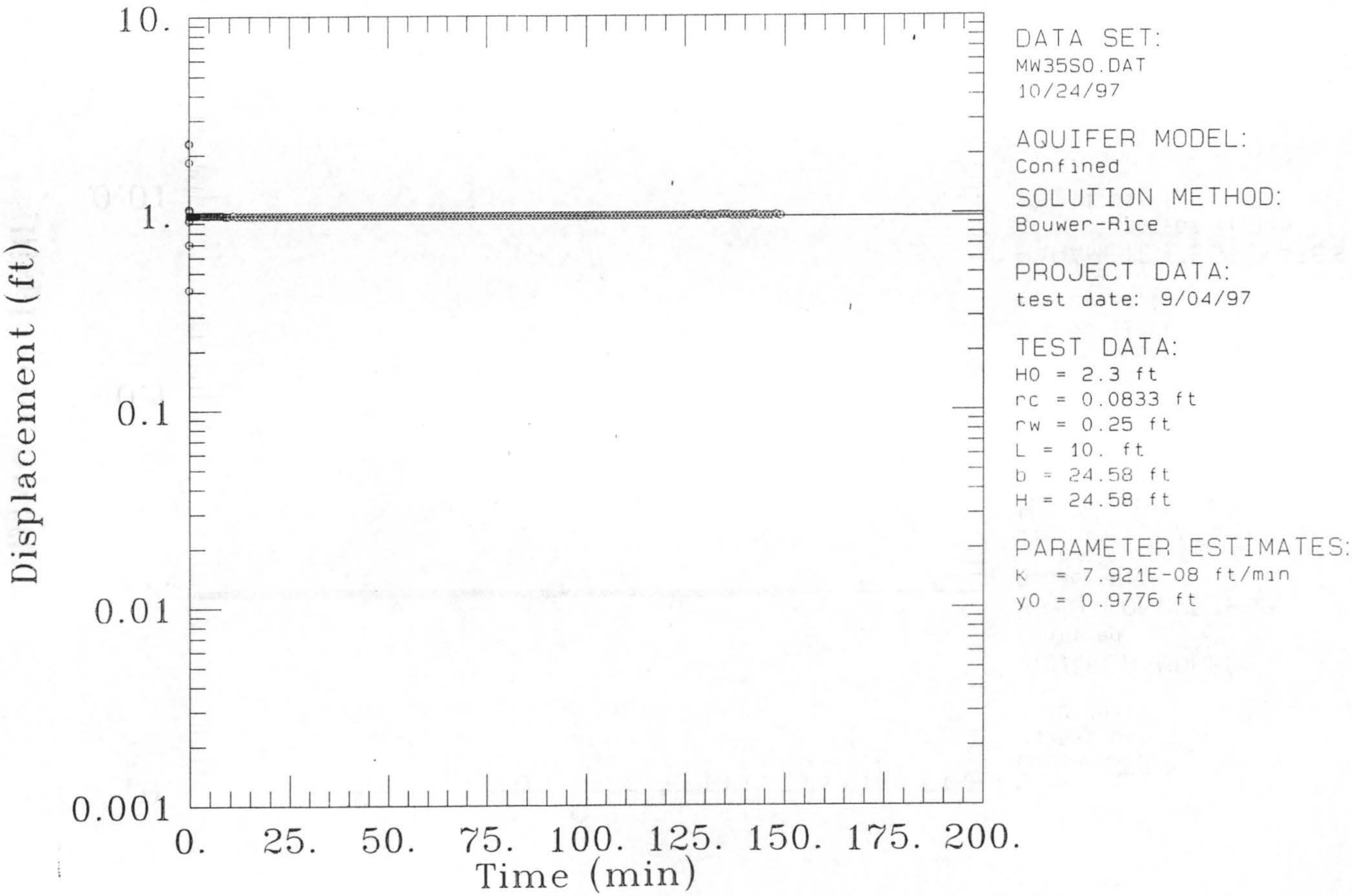
SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 9/03/97

TEST DATA:
H0 = 1.46 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 24.58 ft
H = 24.58 ft

PARAMETER ESTIMATES:
K = 2.039E-07 ft/min
y0 = 1.011 ft

AQTESOLV



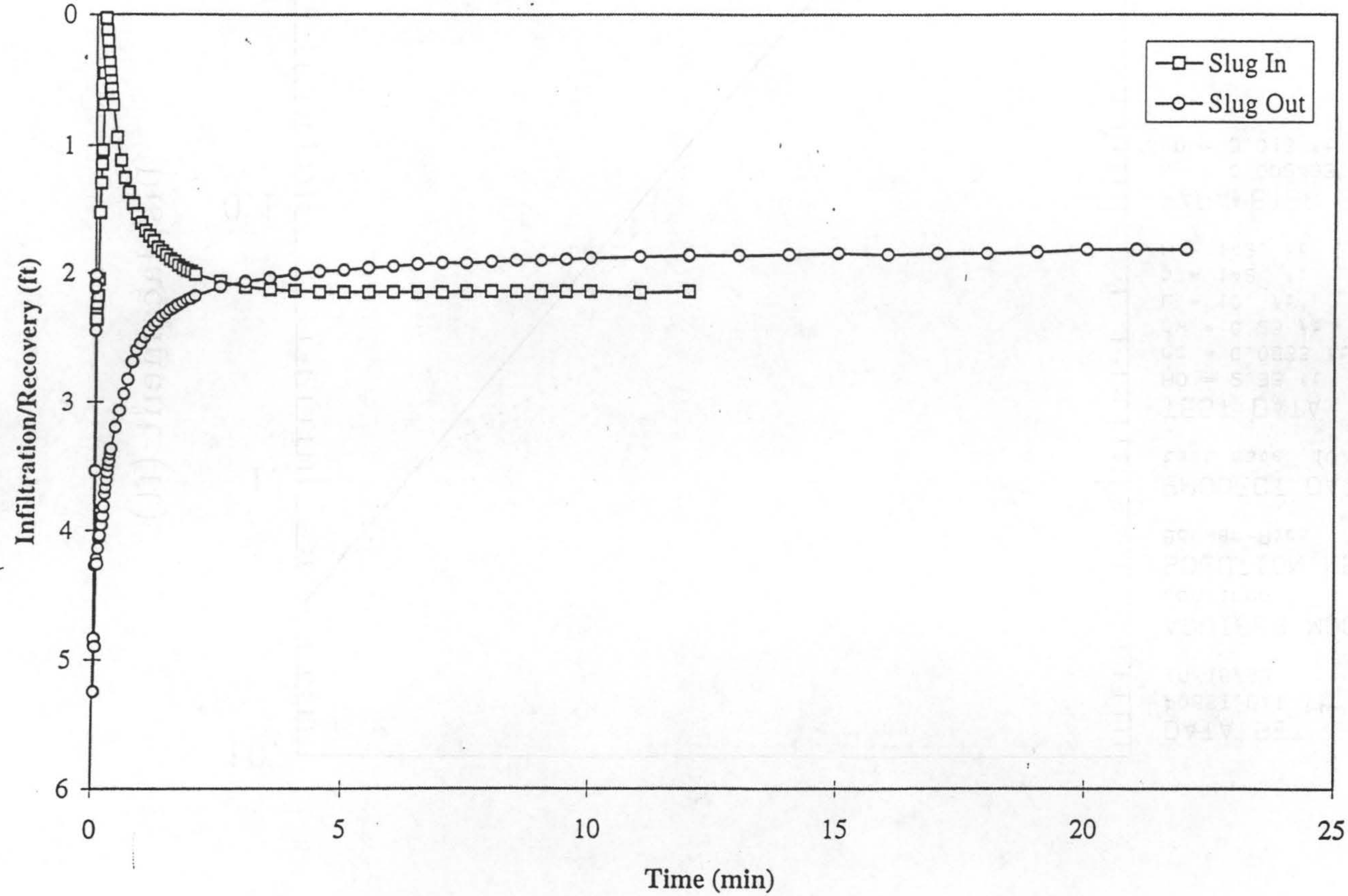
10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
25.
50.
75.
100.
125.
150.
175.
200.
Time (min)
DATA SET:
MW35SO.DAT
10/24/97
AQUIFER MODEL:
Confined
SOLUTION METHOD:
Bouwer-Rice
PROJECT DATA:
test date: 9/04/97
TEST DATA:
H0 = 2.3 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 24.58 ft
H = 24.58 ft
PARAMETER ESTIMATES:
K = 7.921E-08 ft/min
y0 = 0.9776 ft

AQTESOLV

MW-36

~~P-5~~ Slug Test

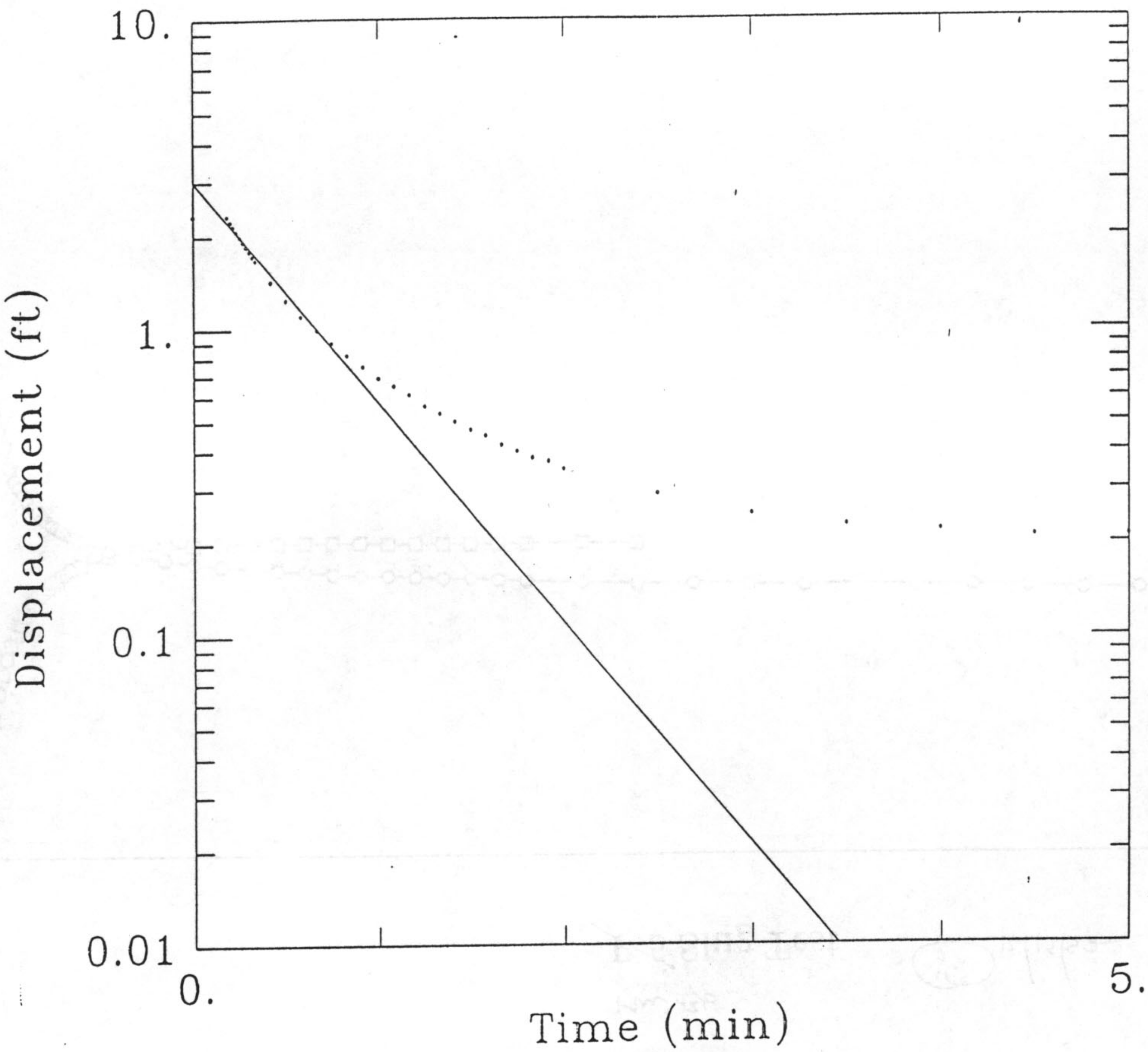
JH 12/19/97



~~0003657~~

JH 12/19/97

523



DATA SET: mw-36
P05SI.DAT
10/18/95

AQUIFER MODEL:
Confined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 10/10/95

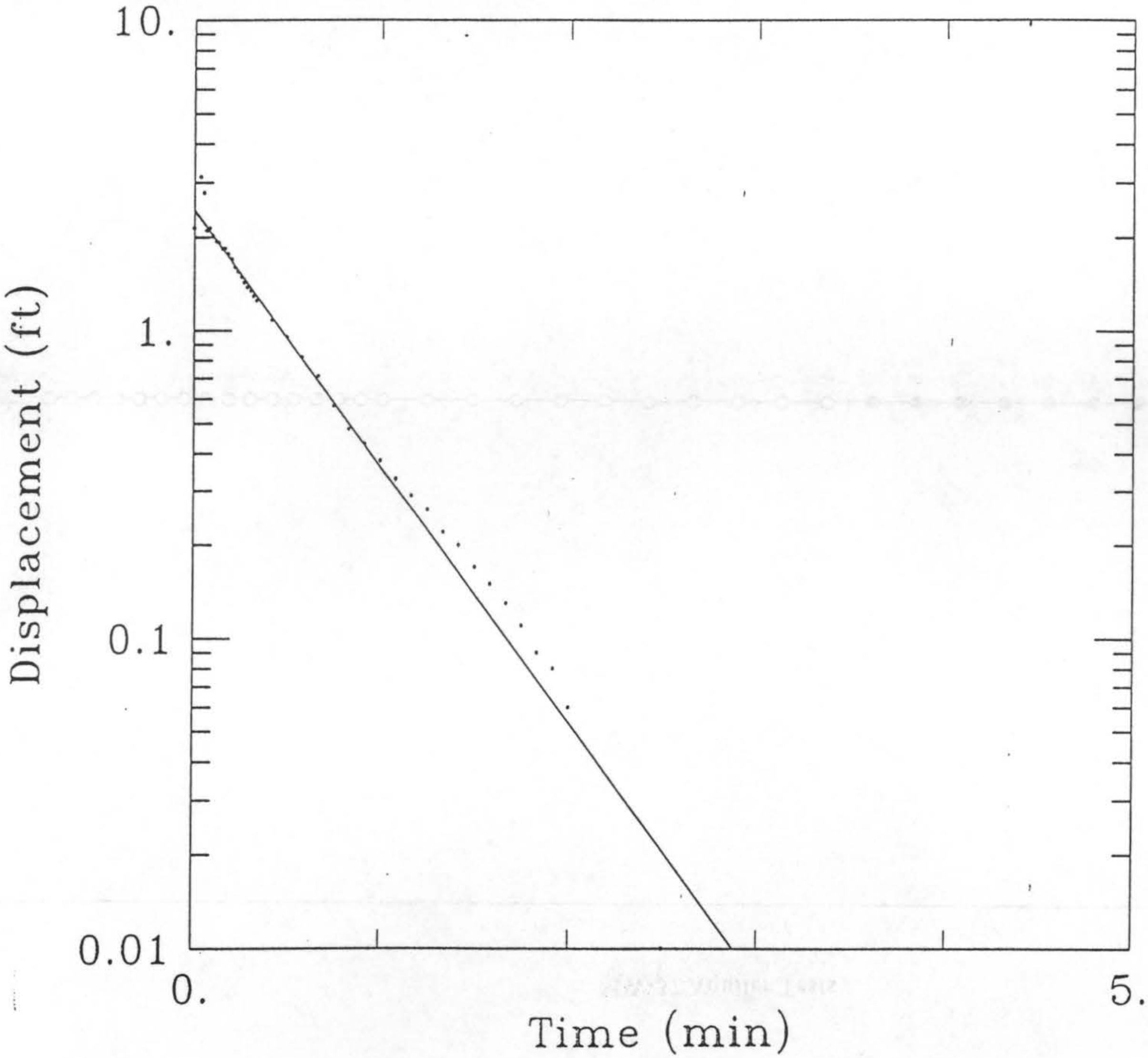
TEST DATA:
H0 = 2.33 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 142. ft
H = 142. ft

PARAMETER ESTIMATES:
K = 0.002483 ft/min
y0 = 3.013 ft

AQTESOLV

~~000366~~

12/19/97



DATA SET:
P05SO.DAT MW-36
10/18/95

AQUIFER MODEL:
Confined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 10/10/95

TEST DATA:
H0 = 2.14 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 142. ft
H = 142. ft

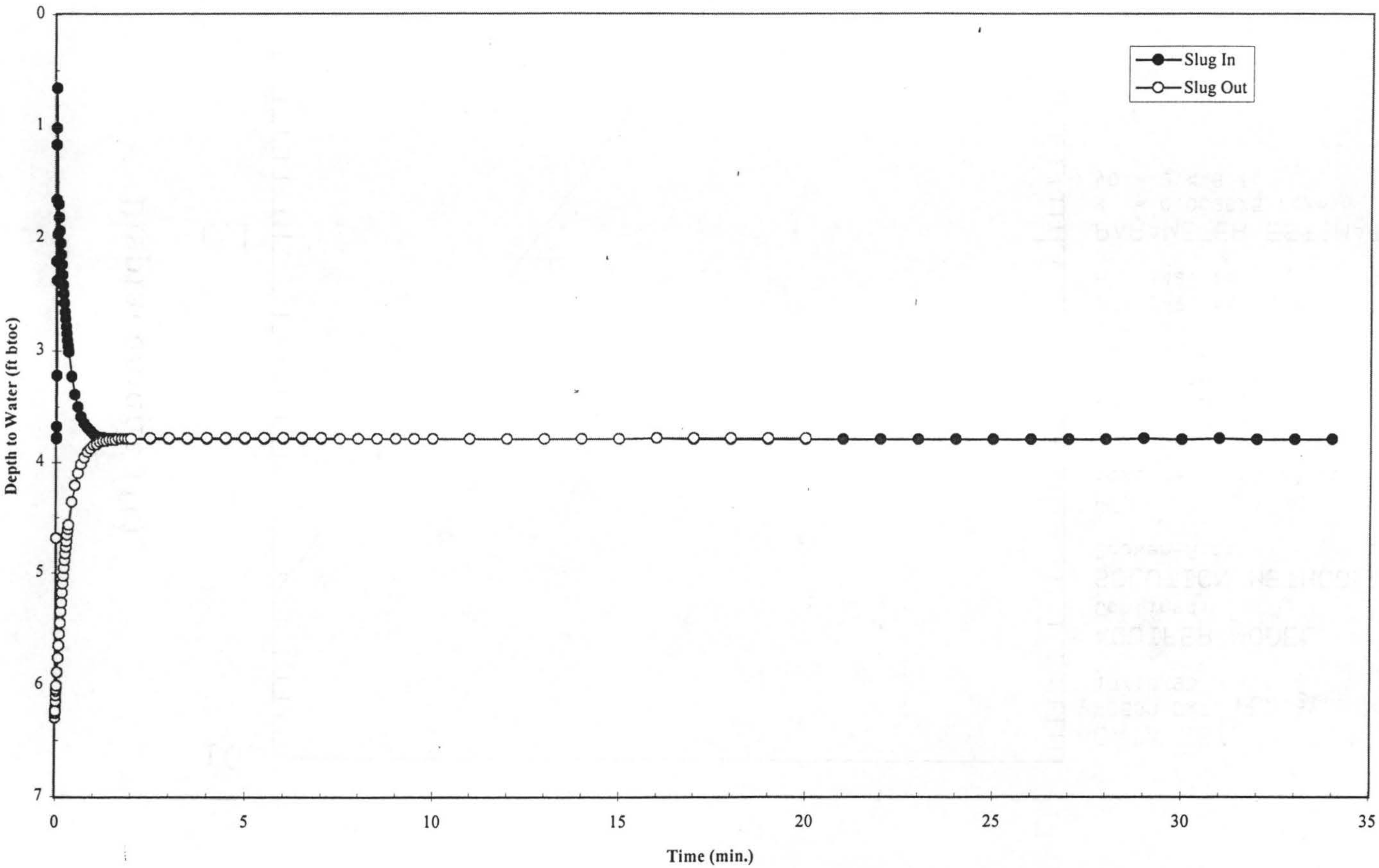
PARAMETER ESTIMATES:
K = 0.002875 ft/min
y0 = 2.448 ft

AQTESOLV

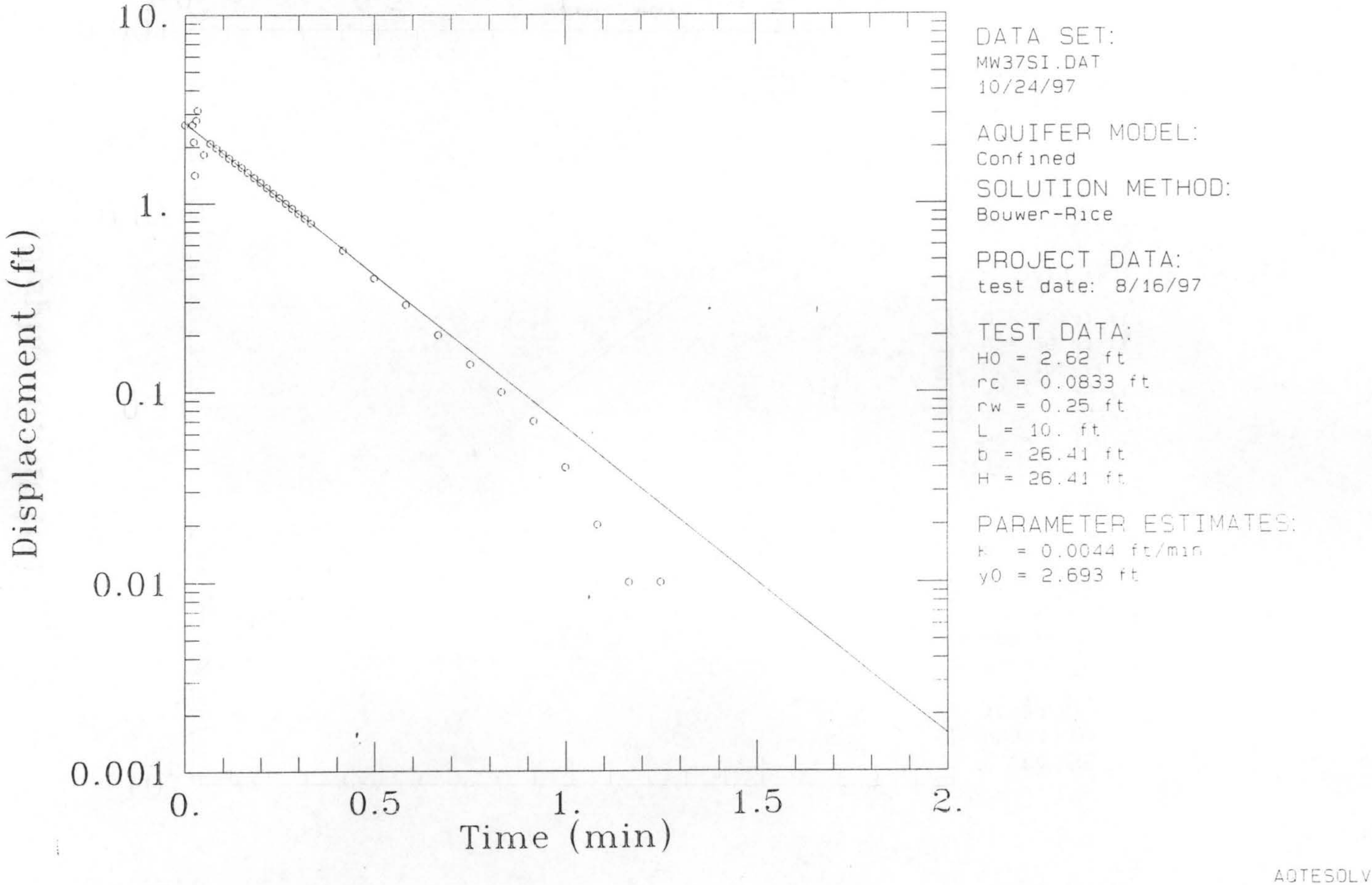
000367
JH 12/9/97

525

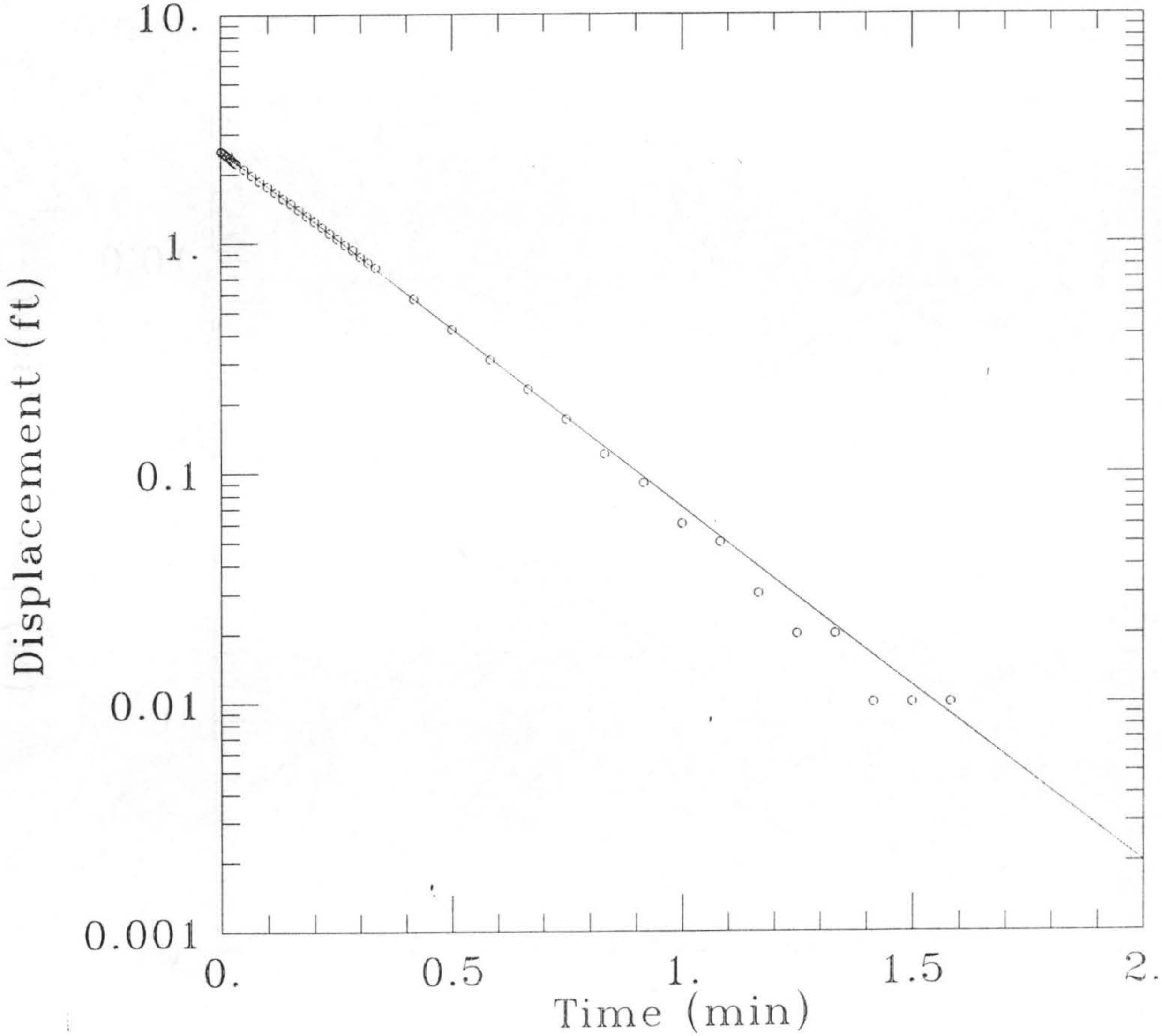
MW-37 Aquifer Tests



526



10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
0.5
1.
1.5
2.
Time (min)
DATA SET:
MW37SI.DAT
10/24/97
AQUIFER MODEL:
Confined
SOLUTION METHOD:
Bouwer-Rice
PROJECT DATA:
test date: 8/16/97
TEST DATA:
H0 = 2.62 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 26.41 ft
H = 26.41 ft
PARAMETER ESTIMATES:
K = 0.0044 ft/min
y0 = 2.693 ft
AQTESOLV



DATA SET:
MW37SO.DAT
10/24/97

AQUIFER MODEL:
Confined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: 8/16/97

TEST DATA:
H0 = 2.51 ft
rc = 0.0833 ft
rw = 0.25 ft
L = 10. ft
b = 26.41 ft
H = 26.41 ft

PARAMETER ESTIMATES:
K = 0.004223 ft/min
y0 = 2.525 ft

AQTESOLV

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S

Version 2.0

Developed by Glenn M. Duffield

10/23/97 14:21:57

==

TEST DESCRIPTION

Data set........... MW21SI.DAT
Output file........ MW21SI.OUT
Data set title..... MW-21 SLUG IN
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/17/97

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.77
   Radius of well casing............ 0.0833
   Radius of wellbore............... 0.25
   Aquifer saturated thickness...... 26.58
   Well screen length............... 10
   Static height of water in well... 26.58

529

Gravel pack porosity............ 0
Effective well casing radius..... 0.0833
Effective wellbore radius........ 0.25
Log(Re/Rw)...................... 3.411
Constants A, B and C............ 0.000 , 0.000, 2.297
No. of observations............. 118

==

ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error	
K =	3.8727E-005	+/-	5.0540E-007	ft/min
y0 =	7.8414E-001	+/-	4.0214E-003	ft

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals.............. 37
Number of estimated parameters.... 2
Degrees of freedom............... 35
Residual mean.................... 0.0002284
Residual standard deviation....... 0.009762

530

Residual variance................ 9.531E-005

Model Residuals:

Time	Observed	Calculated	Residual	Weight
2	0.76	0.73447	0.025534	1
2.5	0.74	0.72255	0.017452	1
3	0.72	0.71082	0.0091774	1
3.5	0.7	0.69929	0.0007123	1
4	0.69	0.68794	0.00206	1
4.5	0.68	0.67678	0.0032236	1
5	0.66	0.66579	-0.0057939	1
5.5	0.66	0.65499	0.0050103	1
6	0.64	0.64436	-0.0043608	1
6.5	0.63	0.6339	-0.0039044	1
7	0.62	0.62362	-0.0036177	1
7.5	0.61	0.6135	-0.0034979	1
8	0.6	0.60354	-0.0035423	1
8.5	0.58	0.59375	-0.013748	1
9	0.57	0.58411	-0.014113	1
9.5	0.57	0.57463	-0.0046344	1
10	0.56	0.56531	-0.0053095	1
11	0.54	0.54711	-0.0071112	1
12	0.52	0.5295	-0.0094987	1
13	0.5	0.51245	-0.012453	1
14	0.49	0.49596	-0.0059564	1
15	0.47	0.47999	-0.0099907	1
16	0.46	0.46454	-0.0045389	1
17	0.45	0.44958	0.00041546	1
18	0.43	0.43511	-0.0051116	1
19	0.41	0.4211	-0.011105	1
20	0.41	0.40755	0.0024515	1

531

21	0.39	0.39443	-0.0044287	1
22	0.38	0.38173	-0.0017314	1
23	0.37	0.36944	0.00055726	1
24	0.38	0.35755	0.02245	1
25	0.36	0.34604	0.01396	1
26	0.35	0.3349	0.0151	1
27	0.33	0.32412	0.0058811	1
28	0.32	0.31368	0.0063151	1
29	0.31	0.30359	0.0064132	1
30	0.3	0.29381	0.0061862	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
K =	3.8727E-005 ft/min
y0 =	7.8414E-001 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

532

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S

Version 2.0

Developed by Glenn M. Duffield

10/23/97 14:23:57

==

TEST DESCRIPTION

Data set........... MW21SO.DAT
Output file........ MW21SO.OUT
Data set title..... MW-21 SLUG OUT
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/17/97

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.1
   Radius of well casing............ 0.0833
   Radius of wellbore............... 0.25
   Aquifer saturated thickness...... 26.58
   Well screen length............... 10
   Static height of water in well... 26.58

533

```
   Gravel pack porosity............. 0
   Effective well casing radius..... 0.0833
   Effective wellbore radius........ 0.25
   Log(Re/Rw)....................... 3.411
   Constants A, B and C............. 0.000 ,  0.000,  2.297
   No. of observations.............. 122
```

==

ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
K =	5.3492E-005	+/-	6.2581E-007 ft/min
y0 =	7.4301E-001	+/-	3.8194E-003 ft

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:

```
   Number of residuals.............. 32
   Number of estimated parameters.... 2
   Degrees of freedom............... 30
   Residual mean.................... 0.0001483
   Residual standard deviation....... 0.007822
```

534

Residual variance................ 6.119E-005

Model Residuals:

Time	Observed	Calculated	Residual	Weight
2	0.69	0.67879	0.011211	1
2.5	0.67	0.66362	0.0063782	1
3	0.65	0.64879	0.0012069	1
3.5	0.64	0.6343	0.0057041	1
4	0.62	0.62012	-0.00012253	1
4.5	0.61	0.60627	0.0037341	1
5	0.59	0.59272	-0.0027189	1
5.5	0.58	0.57947	0.00052542	1
6	0.56	0.56653	-0.0065262	1
6.5	0.54	0.55387	-0.013867	1
7	0.54	0.54149	-0.001491	1
7.5	0.53	0.52939	0.00060857	1
8	0.52	0.51756	0.0024378	1
8.5	0.51	0.506	0.0040027	1
9	0.5	0.49469	0.0053093	1
9.5	0.47	0.48364	-0.013637	1
10	0.46	0.47283	-0.01283	1
11	0.44	0.45194	-0.011935	1
12	0.43	0.43196	-0.001964	1
13	0.41	0.41288	-0.0028752	1
14	0.39	0.39463	-0.00463	1
15	0.38	0.37719	0.002809	1
16	0.36	0.36052	-0.00052266	1
17	0.35	0.34459	0.0054091	1
18	0.35	0.32936	0.020637	1
19	0.31	0.31481	-0.0048084	1
20	0.3	0.3009	-0.00089682	1

21	0.28	0.2876	-0.0076	1
22	0.27	0.27489	-0.0048907	1
23	0.27	0.26274	0.0072569	1
24	0.26	0.25113	0.0088677	1
25	0.25	0.24003	0.0099654	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
K =	5.3492E-005 ft/min
y0 =	7.4301E-001 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

536

SE1000B
'ronmental Logger
15-Aug 20:03

P31 MW-22 (SD) 12/19/97

Unit#	331	Test#	4	
INPUT	1:00	Level	(F)	TOC
Reference	94.2			
Scale factor	9.97			
Offset	0.03			
Step#	0	15-Aug	13:38	
Step#	1	15-Aug	15:08	

P31 MW-22

Time	Slug In	Slug Out
0	93.68	93.64
0.0033	93.67	93.64
0.0066	93.68	93.65
0.0099	93.68	93.68
0.0133	93.68	95.4
0.0166	93.68	94.73
0.02	93.68	94.22
0.0233	93.32	94.89
0.0266	92.85	95.48
0.03	92.78	95.76
0.0333	92.51	95.92
0.05	91.62	95.7
0.0666	91.56	95.58
0.0833	91.37	95.46
0.1	91.77	95.36
0.1166	92.78	95.26
0.1333	91.96	95.17
0.15	92.08	95.07
0.1666	92.18	95
0.1833	92.27	94.91
0.2	92.36	94.84
0.2166	92.45	94.77
0.2333	92.53	94.7
0.25	92.61	94.63
0.2666	92.7	94.57
0.2833	92.76	94.51
0.3	92.83	94.45
0.3166	92.9	94.4
0.3333	92.97	94.35
0.4167	93.33	94.14
0.5	93.56	93.99
0.5833	93.65	93.87
0.6667	93.68	93.79
0.75	93.68	93.74
0.8333	93.68	93.7
0.9167	93.68	93.68
1	93.68	93.67
1.0833	93.68	93.65
1.1667	93.68	93.65
1.25	93.68	93.65

P31 MW-22

Time	Slug In	Slug Out
1.3333	93.68	93.64
1.4166	93.68	93.64
1.5	93.68	93.64
1.5833	93.68	93.64
1.6667	93.68	93.64
1.75	93.68	93.64
1.8333	93.68	93.64
1.9167	93.68	93.64
2	93.67	93.64
2.5	93.68	93.64
3	93.68	93.64
3.5	93.68	93.64
4	93.68	93.64
4.5	93.68	93.64
5	93.68	93.64
5.5	93.68	93.64
6	93.68	93.64
6.5	93.68	93.64
7	93.68	93.64
7.5	93.67	93.64
8	93.68	93.64
8.5	93.68	93.64
9	93.68	93.64
9.5	93.68	93.64
10	93.68	93.64
11	93.68	93.64
12	93.68	93.64
13	93.68	93.64
14	93.68	93.64
15	93.68	93.64
16	93.67	93.64
17	93.67	93.64
18	93.67	93.64
19	93.67	93.63
20	93.67	93.63
21	93.67	93.64
22	93.67	93.63
23	93.67	93.63
24	93.67	93.63
25	93.67	93.63

P31 MW-22

Time	Slug In	Slug Out
26	93.67	93.63
27	93.67	93.63
28	93.67	93.63
29	93.67	93.63
30	93.67	93.63
31	93.67	93.63
32	93.66	93.63
33	93.67	93.63
34	93.67	93.63
35	93.67	93.63
36	93.66	93.63
37	93.66	93.63
38	93.66	93.63
39	93.66	93.63
40	93.66	93.63
41	93.66	93.63
42	93.66	93.63
43	93.66	93.63
44	93.66	93.63
45	93.66	93.63
46	93.66	93.62
47	93.66	93.63
48	93.66	93.62
49	93.66	93.62
50	93.66	93.62
51	93.66	93.62
52	93.66	93.62
53	93.66	93.62
54	93.66	93.62
55	93.66	93.62
56	93.66	93.62
57	93.66	93.62
58	93.65	93.62
59	93.65	93.62
60	93.66	93.62
61	93.66	93.62
62	93.66	93.62
63	93.65	93.62
64	93.65	93.62
65	93.66	93.62

mw-22

~~P-31~~

Time	Slug In	Slug Out
66	93.65	93.62
67	93.66	93.62
68	93.65	93.62
69	93.65	93.62
70	93.65	93.62
71	93.65	93.62
72	93.65	93.62
73	93.65	93.63
74	93.65	93.63
75	93.65	93.63
76	93.65	93.63
77	93.65	93.63
78	93.65	93.63
79	93.65	93.63
80	93.65	93.62
81	93.65	93.62
82	93.65	93.62
83	93.65	93.62
84	93.65	93.62
85	93.65	93.62
86	93.65	93.62
87	93.65	93.62
88	93.65	93.62
89	93.65	93.63
90		93.63
91		93.63
92		93.63
93		93.63
94		93.63
95		93.63
96		93.63
97		93.63
98		93.63
99		93.63
100		93.63
101		93.63
102		93.63
103		93.63
104		93.63
105		93.63

mw-22

~~P-31~~

JG 12/15/97

Time	Slug In	Slug Out
106		93.63
107		93.63
108		93.63
109		93.63
110		93.63
111		93.63
112		93.63
113		93.63
114		93.63
115		93.63
116		93.63
117		93.63
118		93.63
119		93.63
120		93.63
121		93.63
122		93.62
123		93.62
124		93.63
125		93.63
126		93.63
127		93.63
128		93.63
129		93.63
130		93.63
131		93.63
132		93.63
133		93.62
134		93.62
135		93.62
136		93.62
137		93.62
138		93.62
139		93.62

MW-23

~~P-30~~

Time	Slug In	Slug Out
66	39.47	39.85
67	39.47	39.84
68	39.47	39.83
69	39.47	39.83
70	39.47	39.82
71	39.48	39.82
72	39.48	39.81
73	39.48	39.81
74	39.48	39.8
75	39.48	39.8
76	39.48	39.79
77	39.48	39.79
78	39.48	39.78
79	39.48	39.78
80	39.47	39.77
81	39.48	39.77
82	39.48	39.77
83	39.48	39.76
84	39.48	39.76
85	39.48	39.76
86	39.48	39.75
87	39.49	39.75
88	39.48	39.74
89	39.49	39.74
90	39.48	39.73
91	39.48	39.73
92	39.49	39.73
93	39.48	39.72
94	39.48	39.72
95	39.48	39.71
96	39.48	39.71
97	39.48	39.71
98	39.49	39.7
99	39.49	39.7
100	39.48	39.7
101	39.49	39.69
102	39.49	39.69
103	39.48	39.69
104	39.48	39.68
105	39.48	39.68

MW-23

~~P-30~~

Time	Slug In	Slug Out
106	39.48	39.67
107	39.48	39.67
108	39.48	39.67
109	39.48	39.66
110	39.48	39.66
111	39.48	39.66
112	39.48	39.66
113	39.48	39.65
114	39.48	39.65
115	39.48	39.64
116	39.48	39.64
117	39.48	39.64
118	39.48	39.63
119	39.48	39.63
120	39.48	39.63
121	39.47	39.62
122	39.48	39.62
123	39.48	39.61
124	39.47	39.61
125	39.48	39.61
126	39.48	39.6
127	39.47	39.6
128	39.47	39.6
129	39.47	39.6
130	39.47	39.6
131	39.48	39.59
132	39.47	39.59
133	39.47	39.59
134	39.47	39.58
135	39.47	39.58
136	39.47	39.58
137	39.47	39.57
138	39.47	39.57
139	39.46	39.57
140	39.46	39.56
141	39.47	39.56
142	39.46	39.56
143	39.46	39.56
144	39.46	39.55
145	39.45	39.55

MW-23

~~P-30~~

Time	Slug In	Slug Out
146	39.45	39.54
147	39.45	39.54
148	39.45	39.54
149	39.45	39.54
150	39.45	39.54
151	39.45	39.53
152	39.45	39.53
153	39.44	39.53
154	39.44	39.53
155	39.44	39.52
156	39.44	39.52
157	39.44	39.52
158	39.44	39.52
159	39.44	39.51
160	39.44	39.51
161	39.44	39.51
162	39.44	39.5
163	39.44	39.5
164	39.43	39.5
165	39.43	39.5
166	39.43	39.49
167	39.43	39.49
168	39.43	39.49
169	39.43	39.48
170	39.43	39.48
171	39.43	39.48
172	39.43	39.48
173	39.43	39.48
174	39.43	39.47
175	39.43	39.47
176	39.43	39.47
177	39.43	39.47
178	39.43	39.46
179	39.42	39.46
180	39.42	39.46
181		39.46
182		39.45
183		39.45
184		39.45
185		39.45

MW-23

~~P-30~~ JH 12/19/97

Time	Slug In
186	
187	
188	
189	
190	
191	
192	
193	
194	
195	
196	
197	
198	
199	
200	
201	
202	
203	
204	
205	
206	
207	
208	
209	
210	
211	
212	
213	
214	
215	
216	
217	
218	
219	
220	
221	
222	
223	
224	
225	

2/1/96 2:19 PM
g:\proj\f320\aqtest\P30MC.XLS

~~000507~~ JH 12/18/97

SE1000B
Environmental Logger
15-Aug 19:43

~~P30~~ MW-23 (JH) 12/19/97

Unit#	331	Test#	1
INPUT	1:00	Level (F)	TOC
Reference	39.89		
Scale factor	9.97		
Offset	0.03		
Step#	0	14-Aug	10:40
Step#	1	14-Aug	13:41

~~P30~~ MW-23

Time	Slug In	Slug Out
0	39.88	39.42
0.0033	39.88	39.51
0.0066	39.88	40.4
0.0099	39.87	40
0.0133	39.88	40.06
0.0166	38.19	40.09
0.02	38.17	39.45
0.0233	38.03	40.49
0.0266	38.25	39.99
0.03	37.52	39.72
0.0333	36.66	40.68
0.05	37.48	42.07
0.0666	36.87	41.81
0.0833	37.47	41.72
0.1	37.85	41.67
0.1166	38.29	41.62
0.1333	37.76	41.58
0.15	37.77	41.55
0.1666	37.8	41.53
0.1833	37.79	41.5
0.2	37.99	41.48
0.2166	37.96	41.46
0.2333	37.93	41.44
0.25	37.99	41.43
0.2666	38	41.42
0.2833	38.02	41.4
0.3	38.03	41.59
0.3166	38.04	41.43
0.3333	38.05	41.37
0.4167	38.13	41.31
0.5	38.14	41.27
0.5833	38.19	41.24
0.6667	38.23	41.21
0.75	38.25	41.19
0.8333	38.29	41.17
0.9167	38.31	41.15
1	38.34	41.13
1.0833	38.38	41.11
1.1667	38.38	41.09
1.25	38.39	41.08

~~P30~~ MW-23

Time	Slug In	Slug Out
1.3333	38.42	41.06
1.4166	38.41	41.05
1.5	38.45	41.03
1.5833	38.47	41.02
1.6667	38.49	41.01
1.75	38.51	41
1.8333	38.52	40.99
1.9167	38.54	40.98
2	38.55	40.97
2.5	38.62	40.91
3	38.68	40.86
3.5	38.74	40.81
4	38.78	40.77
4.5	38.82	40.74
5	38.86	40.7
5.5	38.89	40.68
6	38.92	40.65
6.5	38.95	40.62
7	38.97	40.6
7.5	39	40.58
8	39.02	40.56
8.5	39.04	40.54
9	39.06	40.52
9.5	39.08	40.5
10	39.09	40.48
11	39.13	40.45
12	39.15	40.42
13	39.17	40.39
14	39.19	40.37
15	39.21	40.34
16	39.22	40.32
17	39.23	40.3
18	39.24	40.28
19	39.26	40.27
20	39.27	40.25
21	39.28	40.23
22	39.29	40.22
23	39.31	40.2
24	39.31	40.19
25	39.32	40.17

~~P30~~ MW-23

Time	Slug In	Slug Out
26	39.33	40.16
27	39.34	40.15
28	39.35	40.13
29	39.35	40.13
30	39.36	40.12
31	39.37	40.1
32	39.37	40.09
33	39.38	40.08
34	39.38	40.07
35	39.39	40.06
36	39.39	40.06
37	39.4	40.04
38	39.4	40.03
39	39.4	40.03
40	39.41	40.01
41	39.41	40.01
42	39.42	40
43	39.42	40
44	39.42	39.99
45	39.43	39.98
46	39.43	39.97
47	39.47	39.97
48	39.43	39.96
49	39.44	39.95
50	39.44	39.94
51	39.44	39.94
52	39.45	39.93
53	39.45	39.92
54	39.45	39.9
55	39.45	39.9
56	39.46	39.9
57	39.46	39.89
58	39.46	39.89
59	39.46	39.89
60	39.46	39.87
61	39.46	39.87
62	39.46	39.87
63	39.47	39.87
64	39.47	39.86
65	39.47	39.85

JH 12/19/97

		MW-23 ~~P-30~~			MW-23 ~~P-30~~			MW-23 ~~P-30~~	
Slug Out	Time	Slug In	Slug Out	Time	Slug In	Slug Out	Time	Slug In	Slug Out
39.44	226		39.35	266		39.27	306		39.19
39.44	227		39.35	267		39.26	307		39.19
39.44	228		39.35	268		39.26	308		39.19
39.43	229		39.34	269		39.26	309		39.19
39.43	230		39.34	270		39.26	310		39.18
39.43	231		39.34	271		39.26	311		39.18
39.43	232		39.34	272		39.25	312		39.18
39.43	233		39.34	273		39.25	313		39.18
39.43	234		39.33	274		39.25	314		39.18
39.42	235		39.33	275		39.25	315		39.18
39.42	236		39.33	276		39.25	316		39.17
39.42	237		39.33	277		39.25	317		39.17
39.42	238		39.32	278		39.24	318		39.17
39.41	239		39.32	279		39.24	319		39.17
39.41	240		39.32	280		39.24	320		39.17
39.41	241		39.32	281		39.24	321		39.17
39.41	242		39.31	282		39.24	322		39.16
39.4	243		39.31	283		39.23	323		39.16
39.4	244		39.31	284		39.23	324		39.16
39.4	245		39.31	285		39.23	325		39.16
39.4	246		39.31	286		39.23	326		39.16
39.39	247		39.31	287		39.23	327		39.15
39.39	248		39.3	288		39.22	328		39.15
39.39	249		39.3	289		39.22	329		39.15
39.39	250		39.3	290		39.22	330		39.15
39.38	251		39.3	291		39.22	331		39.15
39.38	252		39.29	292		39.22			
39.38	253		39.29	293		39.21			
39.38	254		39.29	294		39.21			
39.37	255		39.29	295		39.21			
39.37	256		39.29	296		39.21			
39.37	257		39.29	297		39.21			
39.37	258		39.28	298		39.21			
39.37	259		39.28	299		39.2			
39.36	260		39.28	300		39.2			
39.36	261		39.28	301		39.2			
39.36	262		39.27	302		39.2			
39.36	263		39.27	303		39.2			
39.35	264		39.27	304		39.2			
39.35	265		39.27	305		39.2			

SE1000B
Environmental Logger
23-Aug 15:12

~~P-29~~ MW-24 (JH) 12/9/97

Unit# 331 Test# 2

INPUT 1:00 Level (F) TOC

Reference 16.5
Scale factor 9.97
Offset 0.03

Step# 0 16-Aug 18:01
Step# 1 16-Aug 20:00

Time	Slug In (MW-24 ~~P-29~~)	Slug Out
0	16.52	16.8
0.0033	16.52	16.83
0.0066	16.52	17.62
0.0099	16.52	17.38
0.0133	16.52	17.59
0.0166	16.52	17.87
0.02	16.52	18.12
0.0233	16.57	18.39
0.0266	16.49	18.48
0.03	16.54	18.46
0.0333	16.63	18.43
0.05	16.02	18.39
0.0666	15.33	18.41
0.0833	14.49	18.38
0.1	14.31	18.36
0.1166	14.4	18.39
0.1333	14.31	18.34
0.15	14.15	18.25
0.1666	13.95	18.34
0.1833	14.15	18.34
0.2	13.99	18.34
0.2166	14.3	18.34
0.2333	14.1	18.34
0.25	14.58	18.34
0.2666	14.42	18.34
0.2833	14.09	18.33
0.3	14.15	18.33
0.3166	14.18	18.33
0.3333	14.2	18.33
0.4167	14.18	18.33
0.5	14.22	18.32
0.5833	14.23	18.32
0.6667	14.26	18.31
0.75	14.26	18.31
0.8333	14.28	18.3
0.9167	14.29	18.29
1	14.31	18.29
1.0833	14.31	18.28
1.1667	14.33	18.28
1.25	14.34	18.28

Time	Slug In (MW-24 ~~P-29~~)	Slug Out
1.3333	14.35	18.27
1.4166	14.37	18.27
1.5	14.38	18.26
1.5833	14.39	18.26
1.6667	14.39	18.25
1.75	14.42	18.25
1.8333	14.42	18.24
1.9167	14.43	18.24
2	14.44	18.23
2.5	14.49	18.21
3	14.55	18.18
3.5	14.6	18.16
4	14.67	18.14
4.5	14.74	18.11
5	14.8	18.09
5.5	14.86	18.07
6	14.92	18.05
6.5	14.98	18.03
7	15.03	18
7.5	15.08	17.99
8	15.12	17.96
8.5	15.17	17.94
9	15.21	17.93
9.5	15.25	17.9
10	15.29	17.88
11	15.38	17.85
12	15.45	17.81
13	15.51	17.77
14	15.58	17.74
15	15.63	17.71
16	15.69	17.68
17	15.75	17.65
18	15.8	17.62
19	15.84	17.59
20	15.89	17.57
21	15.93	17.54
22	15.97	17.51
23	16.01	17.49
24	16.04	17.46
25	16.08	17.44

Time	Slug In (MW-24 ~~P-29~~)	Slug Out
26	16.11	17.42
27	16.15	17.4
28	16.18	17.38
29	16.21	17.36
30	16.23	17.34
31	16.26	17.32
32	16.29	17.3
33	16.31	17.29
34	16.33	17.27
35	16.35	17.25
36	16.38	17.24
37	16.4	17.22
38	16.42	17.21
39	16.44	17.19
40	16.45	17.18
41	16.47	17.17
42	16.49	17.15
43	16.5	17.14
44	16.52	17.13
45	16.53	17.12
46	16.54	17.11
47	16.55	17.1
48	16.57	17.09
49	16.58	17.08
50	16.59	17.07
51	16.6	17.06
52	16.61	17.05
53	16.62	17.04
54	16.63	17.04
55	16.64	17.03
56	16.65	17.02
57	16.66	17.01
58	16.67	17.01
59	16.67	17
60	16.68	17
61	16.69	16.99
62	16.69	16.99
63	16.7	16.98
64	16.71	16.97
65	16.71	16.97

~~P-29~~ MW-24

Time	Slug In	Slug Out
66	16.72	16.96
67	16.72	16.96
68	16.73	16.95
69	16.73	16.95
70	16.73	16.95
71	16.74	16.94
72	16.74	16.94
73	16.75	16.93
74	16.75	16.93
75	16.75	16.93
76	16.76	16.92
77	16.76	16.92
78	16.76	16.92
79	16.77	16.91
80	16.77	16.91
81	16.77	16.91
82	16.78	16.9
83	16.78	16.9
84	16.78	16.9
85	16.78	16.9
86	16.78	16.9
87	16.78	16.89
88	16.78	16.89
89	16.79	16.89
90	16.79	16.89
91	16.79	16.88
92	16.79	16.88
93	16.79	16.88
94	16.79	16.88
95	16.79	16.88
96	16.8	16.88
97	16.8	16.87
98	16.8	16.87
99	16.8	16.87
100	16.8	16.87
101	16.8	16.87
102	16.8	16.87
103	16.8	16.86
104	16.8	16.86
105	16.8	16.86

~~P-29~~ MW-24

Time	Slug In	Slug Out
106	16.8	16.86
107	16.8	16.86
108	16.81	16.86
109	16.81	16.86
110	16.81	16.86
111	16.81	16.86
112	16.81	16.85
113	16.81	16.85
114	16.81	16.85
115	16.81	16.85
116	16.81	16.85
117	16.81	16.85
118	16.81	16.85
119		16.85
120		16.85
121		16.85
122		16.85
123		16.85
124		16.84
125		16.84
126		16.84
127		16.84
128		16.84
129		16.84
130		16.84
131		16.84
132		16.84
133		16.84
134		16.84
135		16.84
136		16.84
137		16.84
138		16.84
139		16.84
140		16.84
141		16.84
142		16.84
143		16.84
144		16.84
145		16.84

~~P-29~~ MW-24

Time	Slug In	Slug Out
146		16.84
147		16.84
148		16.84
149		16.84
150		16.84
151		16.84
152		16.84
153		16.84
154		16.84
155		16.84
156		16.84
157		16.84
158		16.84
159		16.83
160		16.84
161		16.84
162		16.83
163		16.83
164		16.83
165		16.83
166		16.83
167		16.83
168		16.83
169		16.83
170		16.83
171		16.83
172		16.83
173		16.83
174		16.83
175		16.83
176		16.83
177		16.83
178		16.83
179		16.83
180		16.83
181		16.83
182		16.83
183		16.83
184		16.83
185		16.83

~~P-29~~ MW-24 JK 12/19/97

Time	Slug In	Slug Out
186		16.83
187		16.83
188		16.83
189		16.83
190		16.83
191		16.83
192		16.83
193		16.83
194		16.83
195		16.83
196		16.83
197		16.83
198		16.83
199		16.83
200		16.83
201		16.83
202		16.83
203		16.83
204		16.83
205		16.83
206		16.83
207		16.82
208		16.82
209		16.82
210		16.83
211		16.82
212		16.83
213		16.82
214		16.82
215		16.82
216		16.82
217		16.82
218		16.82
219		16.82
220		16.82
221		16.82
222		16.82
223		16.82
224		16.82
225		16.82

2/1/96 2:10 PM
g:\proj\tf320\aqtest\P29MC.XLS

~~000502~~ JH 12/19/97

MW-24
~~P-29~~

Time	Slug In	Slug Out
226		16.82
227		16.82
228		16.82
229		16.82
230		16.82
231		16.82
232		16.82
233		16.82
234		16.82
235		16.82
236		16.82
237		16.82
238		16.82
239		16.82
240		16.82
241		16.82
242		16.82
243		16.82
244		16.82
245		16.82
246		16.82
247		16.82
248		16.82
249		16.82
250		16.82
251		16.82
252		16.82
253		16.82
254		16.82
255		16.82
256		16.82
257		16.82
258		16.82
259		16.82
260		16.82
261		16.82
262		16.82
263		16.81
264		16.81
265		16.81

MW-24
~~P-29~~

Time	Slug In	Slug Out
266		16.81
267		16.81
268		16.81
269		16.81
270		16.81
271		16.81
272		16.81
273		16.81
274		16.81
275		16.81
276		16.81
277		16.81
278		16.81
279		16.81
280		16.81
281		16.81
282		16.81
283		16.81
284		16.81
285		16.81
286		16.81
287		16.81
288		16.81
289		16.81
290		16.81
291		16.8
292		16.81
293		16.8
294		16.8
295		16.81
296		16.8
297		16.81
298		16.8
299		16.8
300		16.8
301		16.8
302		16.8
303		16.8
304		16.8
305		16.8

MW-24
~~P-29~~

Time	Slug In	Slug Out
306		16.8
307		16.8
308		16.8
309		16.8
310		16.8
311		16.8
312		16.8
313		16.8
314		16.8
315		16.8
316		16.8
317		16.8
318		16.8
319		16.8
320		16.8
321		16.8
322		16.8
323		16.8
324		16.8
325		16.8
326		16.8
327		16.8
328		16.79
329		16.8
330		16.8
331		16.79
332		16.79
333		16.79
334		16.79
335		16.79
336		16.79
337		16.79
338		16.79
339		16.79
340		16.79
341		16.79
342		16.79
343		16.79
344		16.79
345		16.79

MW-24 JH 12/19/97
~~P-29~~

Time	Slug In	Slug Out
346		16.79
347		16.79
348		16.79
349		16.79
350		16.79
351		16.79
352		16.79
353		16.79
354		16.79
355		16.79
356		16.79
357		16.79
358		16.79
359		16.79
360		16.79
361		16.79
362		16.78
363		16.79
364		16.79
365		16.79
366		16.79
367		16.79
368		16.79
369		16.79
370		16.79
371		16.78
372		16.78
373		16.78
374		16.78
375		16.78
376		16.78
377		16.78
378		16.78
379		16.78
380		16.78
381		16.78
382		16.78
383		16.78
384		16.78
385		16.78

MW-24
~~P-29~~

Time	Slug In	Slug Out
386		16.78
387		16.78
388		16.78
389		16.78
390		16.78
391		16.78
392		16.78
393		16.78
394		16.78
395		16.78
396		16.78
397		16.78
398		16.78
399		16.78
400		16.78
401		16.78
402		16.78
403		16.78
404		16.78
405		16.78
406		16.78
407		16.78
408		16.78
409		16.78
410		16.78
411		16.78
412		16.78
413		16.78
414		16.78
415		16.78
416		16.78
417		16.78
418		16.78
419		16.78
420		16.78
421		16.78
422		16.78
423		16.78
424		16.78
425		16.77

MW-24
~~P-29~~

Time	Slug In	Slug Out
426		16.77
427		16.77
428		16.78
429		16.77
430		16.77
431		16.78
432		16.77
433		16.77
434		16.77
435		16.77
436		16.77
437		16.78
438		16.77
439		16.77
440		16.77
441		16.78
442		16.78
443		16.77
444		16.77
445		16.77
446		16.77
447		16.77
448		16.77
449		16.77
450		16.77
451		16.77
452		16.77
453		16.77
454		16.77
455		16.77
456		16.77
457		16.77
458		16.77
459		16.77
460		16.77
461		16.77
462		16.77
463		16.77
464		16.77
465		16.77

MW-24
~~P-29~~

Time	Slug In	Slug Out
466		16.77
467		16.77
468		16.77
469		16.77
470		16.77
471		16.77
472		16.77
473		16.77
474		16.77
475		16.77
476		16.77
477		16.77
478		16.77
479		16.77
480		16.77
481		16.76
482		16.77
483		16.77
484		16.76
485		16.76
486		16.76
487		16.76
488		16.76
489		16.76
490		16.77
491		16.77
492		16.76
493		16.77
494		16.76
495		16.77
496		16.77
497		16.76
498		16.77
499		16.76
500		16.77
501		16.77
502		16.77
503		16.76
504		16.77
505		16.77

MW-24
~~P-29~~

SH 12/19/97

Time	Slug In	Slug Out
506		16.77
507		16.77
508		16.77
509		16.77
510		16.77
511		16.76
512		16.76
513		16.76
514		16.76
515		16.77
516		16.77
517		16.76
518		16.76
519		16.76
520		16.76
521		16.77
522		16.76
523		16.76
524		16.76
525		16.76
526		16.76
527		16.76
528		16.76
529		16.76
530		16.76
531		16.76
532		16.76
533		16.76
534		16.76
535		16.76
536		16.76
537		16.76
538		16.76
539		16.76
540		16.76
541		16.76
542		16.76
543		16.76
544		16.76
545		16.76

MW-24
~~P-29~~

Time	Slug In	Slug Out
546		16.76
547		16.76
548		16.76
549		16.76
550		16.76
551		16.76
552		16.76
553		16.76
554		16.76
555		16.76
556		16.76
557		16.76
558		16.76
559		16.76
560		16.76
561		16.76
562		16.76
563		16.76
564		16.76
565		16.76
566		16.76
567		16.75
568		16.76
569		16.76
570		16.76
571		16.76
572		16.76
573		16.76
574		16.76
575		16.76
576		16.75
577		16.75
578		16.76
579		16.76
580		16.75
581		16.76
582		16.75
583		16.76
584		16.76
585		16.76

MW-24
~~P-29~~

Time	Slug In	Slug Out
586		16.75
587		16.75
588		16.76
589		16.76
590		16.75
591		16.75
592		16.76
593		16.75
594		16.75
595		16.75
596		16.76
597		16.75
598		16.76
599		16.76
600		16.76
601		16.75
602		16.75
603		16.75
604		16.75
605		16.75
606		16.76
607		16.75
608		16.76
609		16.75
610		16.76
611		16.76
612		16.76
613		16.75
614		16.76
615		16.76
616		16.76
617		16.75
618		16.76
619		16.76
620		16.75
621		16.75
622		16.76
623		16.76
624		16.75
625		16.76

MW-24
~~P-29~~

Time	Slug In	Slug Out
626		16.76
627		16.76
628		16.76
629		16.76
630		16.76
631		16.75
632		16.75
633		16.76
634		16.76
635		16.76
636		16.76
637		16.76
638		16.76
639		16.76
640		16.76
641		16.76
642		16.75
643		16.76
644		16.76
645		16.75
646		16.76
647		16.76
648		16.76
649		16.76
650		16.76
651		16.76
652		16.76
653		16.76
654		16.76
655		16.76
656		16.75
657		16.76
658		16.76
659		16.76
660		16.76
661		16.76
662		16.76
663		16.75
664		16.76
665		16.75

MW-24
~~P-29~~

JH 12/19/97

Time	Slug In	Slug Out
666		16.76
667		16.76
668		16.76
669		16.76
670		16.76
671		16.76
672		16.76
673		16.75
674		16.76
675		16.76
676		16.76
677		16.76
678		16.76
679		16.76
680		16.75
681		16.76
682		16.76
683		16.76
684		16.76
685		16.76
686		16.75
687		16.76
688		16.76
689		16.76
690		16.76
691		16.76
692		16.76
693		16.76
694		16.76
695		16.76
696		16.76
697		16.76
698		16.76

SE1000B
E[illegible]mental Logger
15-Aug 19:57

~~P-285~~ MW-25S JH 12/19/97

Unit# 331 Test# 3

INPUT 1:00 Level (F) TOC

Reference 94.2
Scale factor 9.97
Offset 0.03

Step# 0 15-Aug 7:55
Step# 1 15-Aug 10:02

MW-25S
~~P-28S~~

Time	Slug In	Slug Out
0	95.28	95.25
0.0033	95.28	95.28
0.0066	95.28	95.59
0.0099	95.28	96.07
0.0133	95.26	96.11
0.0166	95.27	95.97
0.02	95.27	96.15
0.0233	95.28	96.65
0.0266	95.28	97.03
0.03	95.28	97.05
0.0333	95.27	96.78
0.05	94.26	96.75
0.0666	93.99	96.7
0.0833	93.65	96.67
0.1	93.37	96.65
0.1166	93.39	96.64
0.1333	93.47	96.61
0.15	93.52	96.59
0.1666	93.55	96.57
0.1833	93.62	96.56
0.2	93.52	96.54
0.2166	93.48	96.52
0.2333	93.54	96.52
0.25	93.57	96.51
0.2666	93.61	96.5
0.2833	93.64	96.48
0.3	93.67	96.47
0.3166	93.7	96.46
0.3333	93.73	96.45
0.4167	93.85	96.41
0.5	93.95	96.37
0.5833	94.04	96.34
0.6667	94.1	96.31
0.75	94.13	96.29
0.8333	94.19	96.26
0.9167	94.23	96.24
1	94.27	96.22
1.0833	94.31	96.21
1.1667	94.34	96.19
1.25	94.37	96.18
1.3333	94.4	96.16
1.4166	94.43	96.15

MW-25S
~~P-28S~~

Time	Slug In	Slug Out
1.5	94.45	96.14
1.5833	94.48	96.12
1.6667	94.49	96.11
1.75	94.52	96.1
1.8333	94.54	96.09
1.9167	94.56	96.08
2	94.58	96.07
2.5	94.68	96.01
3	94.75	95.96
3.5	94.81	95.91
4	94.86	95.87
4.5	94.9	95.84
5	94.95	95.8
5.5	94.98	95.78
6	95	95.75
6.5	95.03	95.72
7	95.05	95.7
7.5	95.06	95.69
8	95.07	95.67
8.5	95.09	95.65
9	95.1	95.63
9.5	95.12	95.62
10	95.13	95.6
11	95.15	95.57
12	95.16	95.56
13	95.18	95.54
14	95.18	95.52
15	95.19	95.51
16	95.2	95.49
17	95.21	95.47
18	95.21	95.47
19	95.22	95.46
20	95.22	95.44
21	95.23	95.44
22	95.23	95.43
23	95.23	95.43
24	95.24	95.42
25	95.24	95.41
26	95.24	95.41
27	95.24	95.4
28	95.24	95.4
29	95.25	95.4

MW-25S
~~P-28S~~

Time	Slug In	Slug Out
30	95.25	95.4
31	95.25	95.39
32	95.25	95.39
33	95.25	95.38
34	95.26	95.38
35	95.26	95.38
36	95.26	95.38
37	95.26	95.38
38	95.26	95.37
39	95.26	95.37
40	95.26	95.37
41	95.26	95.37
42	95.26	95.37
43	95.26	95.36
44	95.26	95.36
45	95.26	95.36
46	95.26	95.36
47	95.26	95.35
48	95.26	95.35
49	95.26	95.35
50	95.26	95.35
51	95.26	95.35
52	95.26	95.35
53	95.26	95.35
54	95.27	95.35
55	95.26	95.34
56	95.27	95.35
57	95.27	95.35
58	95.27	95.34
59	95.27	95.34
60	95.26	95.34
61	95.26	95.34
62	95.26	95.34
63	95.26	95.34
64	95.27	95.34
65	95.26	95.34
66	95.26	95.34
67	95.26	95.34
68	95.26	95.34
69	95.26	95.34
70	95.25	95.34
71	95.25	95.34

2/1/96 1:50 PM
g:\proj\tf320\aqtest\P28SMC.XLS

~~000498~~ JH 12/19/97

MW-25S
~~P-28S~~

Time	Slug In	Slug Out
72	95.24	95.34
73	95.25	95.34
74	95.25	95.35
75	95.25	95.35
76	95.26	95.34
77	95.25	95.34
78	95.26	95.34
79	95.26	95.35
80	95.26	95.34
81	95.26	95.34
82	95.26	95.34
83	95.26	95.34
84	95.26	95.34
85	95.26	95.34
86	95.27	95.34
87	95.27	95.34
88	95.27	95.34
89	95.27	95.35
90	95.27	95.34
91	95.27	95.34
92	95.27	95.34
93	95.27	95.34
94	95.27	95.34
95	95.27	95.34
96	95.27	95.34
97	95.27	95.34
98	95.27	95.33
99	95.27	95.34
100	95.27	95.34
101	95.27	95.34
102	95.27	95.34
103	95.27	95.34
104	95.27	95.33
105	95.27	95.34
106	95.27	95.34
107	95.27	95.34
108	95.27	95.34
109	95.27	95.34
110	95.27	95.34
111	95.27	95.34
112	95.27	95.34
113	95.27	95.34

MW-25S
~~P-28S~~

Time	Slug In	Slug Out
114	95.27	95.34
115	95.27	95.34
116	95.27	95.34
117	95.27	95.34
118	95.27	95.34
119	95.27	95.34
120	95.28	95.34
121	95.27	95.34
122	95.27	95.34
123	95.27	95.34
124	95.27	95.34
125	95.27	95.34
126	95.28	95.34
127	95.25	95.34
128		95.34
129		95.34
130		95.34
131		95.34
132		95.34
133		95.34
134		95.34
135		95.33
136		95.34
137		95.34
138		95.34
139		95.34
140		95.34
141		95.34
142		95.34
143		95.34
144		95.33
145		95.34
146		95.33
147		95.34
148		95.34
149		95.34
150		95.34
151		95.34
152		95.34
153		95.34
154		95.34
155		95.34

MW-28S
~~P-28S~~

Time	Slug In	Slug Out
156		95.34
157		95.34
158		95.34
159		95.33
160		95.33
161		95.34
162		95.34
163		95.33
164		95.34
165		95.34
166		95.34
167		95.34
168		95.34
169		95.34
170		95.34
171		95.34
172		95.34
173		95.34
174		95.34
175		95.34
176		95.34
177		95.34
178		95.33
179		95.34
180		95.34
181		95.34
182		95.34
183		95.34
184		95.33
185		95.34
186		95.34
187		95.34
188		95.34
189		95.34
190		95.34
191		95.34
192		95.34
193		95.34
194		95.34
195		95.34
196		95.33

SE1000B
Environmental Logger
17-Oct 11:23

~~-28D~~ MW-25D (JH) 12/9/97

Unit#	331	Test#	2
INPUT	1:00	Level (F)	TOC
Reference	16.67		
Scale factor	9.97		
Offset	0.03		
Step#	0	13-Oct	7:50
Step#	1	13-Oct	12:51

MW-25D
~~P-28D~~

Time	Slug In	Slug Out
0	16.8	16.67
0.0033	16.8	16.69
0.0066	16.79	18.17
0.0099	16.81	17.94
0.0133	16.8	17.7
0.0166	16.75	17.36
0.02	16.38	16.78
0.0233	15.14	17.57
0.0266	15.67	17.77
0.03	15.56	17.62
0.0333	14.5	16.95
0.05	13.95	18.49
0.0666	13.62	19.24
0.0833	14.6	19.17
0.1	14.27	19.15
0.1166	14.43	19.12
0.1333	14.41	19.11
0.15	14.43	19.1
0.1666	14.17	19.09
0.1833	14.23	19.09
0.2	14.43	19.08
0.2166	14.48	19.08
0.2333	14.46	19.08
0.25	14.46	19.08
0.2666	14.46	19.08
0.2833	14.46	19.08
0.3	14.47	19.07
0.3166	14.47	19.07
0.3333	14.48	19.07
0.4167	14.49	19.06
0.5	14.48	19.06
0.5833	14.5	19.05
0.6667	14.52	19.05
0.75	14.53	19.04
0.8333	14.53	19.05
0.9167	14.54	19.04
1	14.54	19.03
1.0833	14.55	19.03
1.1667	14.55	19.03
1.25	14.56	19.03
1.3333	14.56	19.02

MW-25D
~~P-28D~~

Time	Slug In	Slug Out
1.4166	14.57	19.02
1.5	14.57	19.02
1.5833	14.58	19.02
1.6667	14.58	19.02
1.75	14.59	19.01
1.8333	14.59	19.01
1.9167	14.6	19.01
2	14.6	19.01
2.5	14.63	18.99
3	14.66	18.98
3.5	14.68	18.97
4	14.71	18.96
4.5	14.73	18.95
5	14.75	18.94
5.5	14.77	18.93
6	14.78	18.92
6.5	14.8	18.91
7	14.82	18.9
7.5	14.83	18.89
8	14.86	18.88
8.5	14.87	18.87
9	14.88	18.86
9.5	14.9	18.85
10	14.91	18.85
12	14.95	18.81
14	15.01	18.78
16	15.05	18.75
18	15.09	18.72
20	15.12	18.69
22	15.16	18.67
24	15.2	18.64
26	15.23	18.62
28	15.26	18.59
30	15.29	18.57
32	15.31	18.55
34	15.34	18.53
36	15.36	18.5
38	15.39	18.48
40	15.41	18.46
42	15.43	18.45
44	15.46	18.43

MW-25D
~~P-28D~~

Time	Slug In	Slug Out
230	16.5	17.53
240	16.53	17.5
250	16.56	17.48
260	16.59	17.46
270	16.61	17.44
280	16.63	17.42
290	16.65	17.4
300	16.67	17.39
310		17.37
320		17.35

2/1/96 1:03 PM
g:\proj\tf320\aqtest\P28DMC.XLS

(JH) 12/15/97

~~000500~~

SE1000B
Environmental Logger
MW-27 12-Aug 8:49

Unit#	331	Test#		4
INPUT	1:00	Level	(F)	TOC
Reference	17.74			
Scale factor	9.97			
Offset	0.03			
Step#	0	10-Aug	17:13	
Step#	1	10-Aug	17:34	

MW-27
~~P-26~~

Time	Slug In	Slug Out
0	17.74	17.74
0.0033	17.74	17.74
0.0066	17.74	17.74
0.0099	17.74	17.74
0.0133	17.73	17.68
0.0166	17.28	17.99
0.02	17.53	18.54
0.0233	17.02	17.21
0.0266	16.67	17.95
0.03	16.2	19.38
0.0333	15.74	18.38
0.05	15.56	19.99
0.0666	16.14	19.62
0.0833	16.38	19.33
0.1	16.59	19.07
0.1166	16.77	18.88
0.1333	16.93	18.65
0.15	17.07	18.53
0.1666	17.18	18.4
0.1833	17.28	18.29
0.2	17.36	18.19
0.2166	17.45	18.11
0.2333	17.53	18.05
0.25	17.53	17.96
0.2666	17.57	17.93
0.2833	17.61	17.9
0.3	17.63	17.87
0.3166	17.65	17.85
0.3333	17.67	17.82
0.4167	17.72	17.77
0.5	17.73	17.75
0.5833	17.74	17.74
0.6667	17.74	17.74
0.75	17.74	17.74
0.8333	17.74	17.74
0.9167	17.74	17.74
1	17.74	17.74
1.0833	17.74	17.74
1.1667	17.74	17.74
1.25	17.74	17.74
1.3333	17.74	17.74
1.4166	17.74	17.74
1.5	17.74	17.74
1.5833	17.74	17.74

MW-27
~~P-26~~
JH 12/9/97

Time	Slug In	Slug Out
1.6667	17.74	17.74
1.75	17.74	17.74
1.8333	17.74	17.74
1.9167	17.74	17.74
2	17.74	17.74
2.5	17.74	17.74
3	17.74	17.74
3.5	17.74	17.74
4	17.74	17.74
4.5	17.74	17.74
5	17.74	17.74
5.5	17.74	17.74
6	17.74	17.74
6.5	17.74	17.74
7	17.74	17.74
7.5	17.74	17.74
8	17.74	17.74
8.5	17.74	17.74
9	17.74	17.74
9.5	17.74	17.74
10	17.74	17.74
11	17.74	17.74
12	17.74	
13	17.74	
14	17.74	
15	17.74	
16	17.74	
17	17.74	
18	17.74	
19	17.74	
20	17.74	

SE1000B
Environmental Logger
2-Aug 17:16

~~P-25~~ MW-28 JH 12/19/97

Unit# 331 Test# 1

INPUT 1:00 Level (F) TOC

Reference 20.1
Scale factor 9.97
Offset 0.03

Step# 0 1-Aug 8:46
Step# 1 1-Aug 9:07

P-25 MW-28

Time	Slug In	Slug Out
0	20.1	20.1
0.0033	20.1	20.1
0.0066	20.1	20.1
0.0099	20.08	20.1
0.0133	20.08	20.14
0.0166	20.08	22.46
0.02	20.13	21.89
0.0233	19.64	21.02
0.0266	18.63	20.95
0.03	19.25	20.98
0.0333	18.74	21.03
0.05	17.78	22.6
0.0666	17	22.45
0.0833	17.91	22.34
0.1	17.72	22.25
0.1166	18.99	22.16
0.1333	18.26	22.08
0.15	18.22	22
0.1666	18.35	21.92
0.1833	18.38	21.87
0.2	18.42	21.81
0.2166	18.51	21.75
0.2333	18.54	21.7
0.25	18.59	21.66
0.2666	18.61	21.61
0.2833	18.66	21.56
0.3	18.7	21.52
0.3166	18.74	21.48
0.3333	18.8	21.44
0.4167	18.96	21.26
0.5	19.1	21.12
0.5833	19.22	21
0.6667	19.29	20.9
0.75	19.39	20.82
0.8333	19.46	20.75
0.9167	19.52	20.68
1	19.58	20.63
1.0833	19.6	20.58
1.1667	19.65	20.54
1.25	19.7	20.51
1.3333	19.73	20.47
1.4166	19.78	20.44

P-25 MW-28

Time	Slug In	Slug Out
1.5	19.81	20.42
1.5833	19.81	20.4
1.6667	19.83	20.38
1.75	19.86	20.36
1.8333	19.87	20.34
1.9167	19.89	20.33
2	19.91	20.31
2.5	19.95	20.25
3	20.01	20.21
3.5	20.04	20.19
4	20.05	20.17
4.5	20.06	20.15
5	20.07	20.15
5.5	20.08	20.14
6	20.08	20.13
6.5	20.08	20.13
7	20.09	20.12
7.5	20.09	20.12
8	20.09	20.12
8.5	20.09	20.12
9	20.09	20.11
9.5	20.09	20.11
10	20.09	20.11
11	20.1	20.11
12	20.1	20.11
13	20.1	20.11
14	20.1	20.1
15	20.11	20.11
16	20.11	20.11
17	20.11	20.1
18	20.11	20.11
19	20.11	20.11
20	20.11	20.1
21	20.1	20.1
22		20.1
23		20.1
24		20.1
25		20.1
26		20.1
27		20.1
28		20.1
29		20.1

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S

Version 2.0

Developed by Glenn M. Duffield

10/23/97 11:19:30

==

TEST DESCRIPTION

Data set........... MW29SI.DAT
Output file........ MW29SI.OUT
Data set title..... MW-29 SLUG IN
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/16/97

Units of Measurement
Length.......... ft
Time............ min

Test Well Data
Initial displacement in well..... 2.31
Radius of well casing............ 0.0833
Radius of wellbore............... 0.25
Aquifer saturated thickness...... 10.43
Well screen length............... 10
Static height of water in well... 10.43

Gravel pack porosity............. 0.3
Effective well casing radius..... 0.1536
Effective wellbore radius........ 0.25
Log(Re/Rw)....................... 2.839
Constants A, B and C............. 0.000 , 0.000, 2.297
No. of observations.............. 15

==

ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error	
K =	1.3912E-001	+/-	3.2530E-002	ft/min
y0 =	2.9554E+000	+/-	9.2059E-001	ft

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals.............. 8
Number of estimated parameters.... 2
Degrees of freedom............... 6
Residual mean.................... 0.006072
Residual standard deviation....... 0.118

553

Residual variance................ 0.01391

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0266	0.92	0.97949	-0.059489	1
0.03	1.06	0.85054	0.20946	1
0.0333	0.57	0.74164	-0.17164	1
0.05	0.4	0.37075	0.029251	1
0.0666	0.14	0.18611	-0.04611	1
0.0833	0.12	0.093037	0.026963	1
0.1	0.1	0.046509	0.053491	1
0.1166	0.03	0.023347	0.006653	1

===

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
K =	1.3912E-001 ft/min
y0 =	2.9554E+000 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

554

```
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

                        A Q T E S O L V   R E S U L T S
                                  Version 2.0

                         Developed by Glenn M. Duffield
                    (c) 1993, 1994 Geraghty & Miller, Inc.

10/23/97                                                                11:37:11

================================================================================
                                TEST DESCRIPTION

Data set........... MW29SO.DAT
Output file........ MW29SO.OUT
Data set title..... MW-29 SLUG OUT
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/16/97

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.48
   Radius of well casing............ 0.0833
   Radius of wellbore............... 0.25
   Aquifer saturated thickness...... 10.43
   Well screen length............... 10
   Static height of water in well... 10.43
```

555

Gravel pack porosity............. 0.3
Effective well casing radius..... 0.1536
Effective wellbore radius........ 0.25
Log(Re/Rw)....................... 2.839
Constants A, B and C............. 0.000 , 0.000, 2.297
No. of observations.............. 34

ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
K =	1.0201E-001	+/-	2.6660E-002 ft/min
y0 =	1.7810E+000	+/-	3.0832E-001 ft

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals.............. 12
Number of estimated parameters.... 2
Degrees of freedom............... 10
Residual mean.................... -0.01483
Residual standard deviation....... 0.2219

556

Residual variance................. 0.04924

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0099	1.48	1.3176	0.16238	1
0.0133	0.71	1.1881	-0.47807	1
0.0166	0.92	1.0745	-0.15452	1
0.02	1.16	0.96887	0.19113	1
0.0233	1.13	0.87627	0.25373	1
0.0266	0.99	0.79252	0.19748	1
0.03	0.81	0.7146	0.095398	1
0.0333	0.66	0.6463	0.013695	1
0.05	0.21	0.38874	-0.17874	1
0.0666	0.08	0.23453	-0.15453	1
0.0833	0.06	0.14107	-0.081067	1
0.1	0.04	0.084849	-0.044849	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

```
          Estimate
   K  =   1.3100E-001 ft/min
   y0 =   1.4855E+000 ft
```

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

557

SE1000B
Environmental Logger
10-Aug 8:12

~~P-245~~ MW-30 S JH 12/9/97

Unit# 331 Test# 4

INPUT 1:00 Level (F) TOC

Reference 26.88
Scale factor 9.97
Offset 0.03

Step# 0 9-Aug 11:02
Step# 1 9-Aug 11:28

MW-30S
~~P-245~~

Time	Slug In	Slug Out
0	26.9	26.88
0.0033	26.9	26.88
0.0066	26.89	26.98
0.0099	26.89	28.74
0.0133	27.18	28.21
0.0166	26.85	26.74
0.02	26.9	27.66
0.0233	26.84	27.17
0.0266	26.91	26.33
0.03	26.88	28.15
0.0333	26.88	27.88
0.05	27.87	28.67
0.0666	25.02	28.8
0.0833	25.48	28.58
0.1	25.41	28.4
0.1166	24.63	28.25
0.1333	26.18	28.11
0.15	25.59	27.98
0.1666	26.09	27.86
0.1833	26.16	27.76
0.2	25.93	27.66
0.2166	26.03	27.58
0.2333	26.12	27.51
0.25	26.21	27.42
0.2666	26.27	27.36
0.2833	26.34	27.32
0.3	26.4	27.26
0.3166	26.46	27.22
0.3333	26.51	27.16
0.4167	27.07	27.02
0.5	27.03	26.95
0.5833	26.99	26.92
0.6667	26.96	26.9
0.75	26.89	26.89
0.8333	26.88	26.88
0.9167	26.87	26.88
1	26.89	26.88
1.0833	26.89	26.88
1.1667	26.89	26.88
1.25	26.89	26.88
1.3333	26.88	26.88

MW-30S
~~P-245~~

Time	Slug In	Slug Out
1.4166	26.89	26.88
1.5	26.88	26.88
1.5833	26.89	26.88
1.6667	26.88	26.88
1.75	26.89	26.88
1.8333	26.88	26.88
1.9167	26.89	26.88
2	26.88	26.88
2.5	26.88	26.88
3	26.89	26.88
3.5	26.89	26.88
4	26.88	26.88
4.5	26.88	26.88
5	26.89	26.88
5.5	26.88	26.88
6	26.88	26.88
6.5	26.89	26.88
7	26.89	26.88
7.5	26.88	26.88
8	26.88	26.88
8.5	26.88	26.87
9	26.88	26.87
9.5	26.88	26.87
10	26.88	26.87
11	26.88	26.87
12	26.87	26.87
13	26.88	26.87
14	26.88	26.87
15	26.88	26.88
16	26.88	26.88
17	26.89	26.87
18	26.88	26.87
19	26.88	26.87
20	26.88	26.87
21	26.88	26.87
22	26.88	
23	26.88	
24	26.88	
25	26.88	
26	26.88	

SE1000B
Environmental Logger
10-Aug 8:15

~~P-24~~ MW-30D JH 12/19/97

Unit# 331 Test# 5

INPUT 1:00 Level (F) TOC

Reference 25.24
Scale factor 9.97
Offset 0.03

Step# 0 9-Aug 12:08
Step# 1 9-Aug 12:20

MW-30D
~~P-24D~~

Time	Slug In	Slug Out
0	25.24	25.23
0.0033	25.24	25.23
0.0066	25.24	25.23
0.0099	25.24	25.23
0.0133	25.24	25.23
0.0166	25.24	25.23
0.02	25.24	25.23
0.0233	25.24	25.23
0.0266	25.24	25.23
0.03	25.23	25.23
0.0333	25.24	25.75
0.05	25.25	26.44
0.0666	25.22	27.54
0.0833	25.24	27.44
0.1	25.24	27.39
0.1166	24.76	27.34
0.1333	24.27	27.3
0.15	23.13	27.25
0.1666	23.43	27.21
0.1833	23.29	27.18
0.2	23.35	27.15
0.2166	23.52	27.11
0.2333	22.99	27.07
0.25	23.84	27.04
0.2666	23.72	27.01
0.2833	23.76	26.98
0.3	23.81	26.95
0.3166	23.79	26.92
0.3333	23.57	26.89
0.4167	23.21	26.76
0.5	23.48	26.64
0.5833	23.69	26.53
0.6667	23.8	26.44
0.75	23.92	26.35
0.8333	24.02	26.27
0.9167	24.11	26.19
1	24.2	26.12
1.0833	24.28	26.06
1.1667	24.35	26
1.25	24.42	25.95
1.3333	24.48	25.9

MW-30D
~~P-24D~~

Time	Slug In	Slug Out
1.4166	24.54	25.86
1.5	24.59	25.81
1.5833	24.64	25.77
1.6667	24.68	25.74
1.75	24.72	25.71
1.8333	24.76	25.68
1.9167	24.81	25.65
2	24.86	25.62
2.5	25.04	25.5
3	25.12	25.42
3.5	25.17	25.37
4	25.19	25.33
4.5	25.2	25.3
5	25.21	25.29
5.5	25.21	25.28
6	25.22	25.27
6.5	25.22	25.26
7	25.22	25.26
7.5	25.22	25.25
8	25.22	25.25
8.5	25.22	25.25
9	25.22	25.25
9.5	25.22	25.25
10	25.22	25.25
11	25.22	25.24
12		25.24
13		25.24
14		25.24
15		25.24
16		25.24
17		25.24
18		25.23
19		25.24
20		25.23
21		25.24
22		25.24
23		25.24
24		25.24
25		25.24
26		25.24
27		25.23

MW-30D
~~P-24D~~

Time	Slug In	Slug Out
28		25.23
29		25.23
30		25.23
31		25.23
32		25.24
33		25.24
34		25.24
35		25.24
36		25.24
37		25.24
38		25.22
39		25.23
40		25.23
41		25.23
42		25.22
43		25.22
44		25.22
45		25.22
46		25.22
47		25.22
48		25.23
49		25.26
50		25.28
51		25.29
52		25.29
53		25.29
54		25.28
55		25.26
56		25.25
57		25.27
58		25.28
59		25.26
60		25.25
61		25.24
62		25.24
63		25.24
64		25.24
65		25.24
66		25.24
67		25.25
68		25.24

MW-30D
~~P-24D~~

Time	Slug In	Slug Out
69		25.24
70		25.24
71		25.24
72		25.24
73		25.24
74		25.24
75		25.24
76		25.24
77		25.24
78		25.23
79		25.23
80		25.23
81		25.23
82		25.23
83		25.23
84		25.23
85		25.23
86		25.23
87		25.23
88		25.23
89		25.22
90		25.22
91		25.23
92		25.23
93		25.23
94		25.23
95		25.22
96		25.22
97		25.22
98		25.22
99		25.22

2/1/96 12:45 PM
g:\proj\tf320\sqtest\P24DMC.XLS

JH 12/19/97

~~000495~~

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S

Version 2.0

Developed by Glenn M. Duffield

10/23/97 14:28:23

==

TEST DESCRIPTION

Data set........... MW31SI.DAT
Output file........ MW31SI.OUT
Data set title..... MW-31 SLUG IN
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/17/97

Units of Measurement
Length.......... ft
Time............ min

Test Well Data
Initial displacement in well..... 4.74
Radius of well casing........... 0.0833
Radius of wellbore............... 0.25
Aquifer saturated thickness...... 28.53
Well screen length.............. 10
Static height of water in well... 28.53

560

Gravel pack porosity............. 0
Effective well casing radius..... 0.0833
Effective wellbore radius........ 0.25
Log(Re/Rw)....................... 3.453
Constants A, B and C............. 0.000 , 0.000, 2.297
No. of observations.............. 59

==

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error	
K =	3.3096E-004	+/-	7.1804E-006	ft/min
y0 =	2.1626E+000	+/-	1.0013E-002	ft

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals.............. 37
Number of estimated parameters.... 2
Degrees of freedom............... 35
Residual mean.................... 0.0003265
Residual standard deviation....... 0.03511

561

Residual variance................. 0.001232

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0666	2.13	2.1232	0.0067863	1
0.0833	2.18	2.1134	0.06656	1
0.1	2.16	2.1037	0.056289	1
0.1166	2.14	2.0941	0.045914	1
0.1333	2.13	2.0844	0.045554	1
0.15	2.11	2.0749	0.035149	1
0.1666	2.09	2.0654	0.024643	1
0.1833	2.07	2.0558	0.01415	1
0.2	2.06	2.0464	0.013614	1
0.2166	2.04	2.037	0.0029776	1
0.2333	2.03	2.0276	0.0023545	1
0.25	2.01	2.0183	-0.0083118	1
0.2666	2	2.0091	-0.0090766	1
0.2833	1.98	1.9998	-0.019828	1
0.3	1.97	1.9906	-0.020623	1
0.3166	1.96	1.9815	-0.021514	1
0.3333	1.94	1.9724	-0.032393	1
0.4167	1.89	1.9275	-0.037465	1
0.5	1.84	1.8836	-0.043613	1
0.5833	1.79	1.8408	-0.050759	1
0.6667	1.75	1.7988	-0.04883	1
0.75	1.71	1.7579	-0.047904	1
0.8333	1.67	1.7179	-0.04791	1
0.9167	1.64	1.6788	-0.038779	1
1	1.6	1.6406	-0.040585	1
1.0833	1.58	1.6033	-0.02326	1
1.1667	1.55	1.5667	-0.01674	1

562

1.25	1.52	1.5311	-0.011095	1
1.3333	1.49	1.4963	-0.0062609	1
1.4166	1.46	1.4622	-0.0022192	1
1.5	1.43	1.4289	0.0010875	1
1.5833	1.41	1.3964	0.013597	1
1.6667	1.39	1.3646	0.025404	1
1.75	1.37	1.3335	0.036451	1
1.8333	1.35	1.3032	0.04679	1
1.9167	1.32	1.2735	0.046475	1
2	1.3	1.2446	0.055449	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

Estimate
K = 3.3096E-004 ft/min
y0 = 2.1626E+000 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>

563

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 2.0

Developed by Glenn M. Duffield

10/23/97 14:31:26

==

TEST DESCRIPTION

Data set........... MW31SO.DAT
Output file........ MW31SO.OUT
Data set title..... MW-31 SLUG OUT
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/17/97

Units of Measurement
Length.......... ft
Time............ min

Test Well Data
Initial displacement in well..... 2.39
Radius of well casing............ 0.0833
Radius of wellbore............... 0.25
Aquifer saturated thickness...... 28.53
Well screen length............... 10
Static height of water in well... 28.53

564

```
Gravel pack porosity............ 0
Effective well casing radius..... 0.0833
Effective wellbore radius........ 0.25
Log(Re/Rw)....................... 3.453
Constants A, B and C............ 0.000 ,  0.000,  2.297
No. of observations.............. 54
```

==

ANALYTICAL METHOD

Bouwer-Rice (Unconfined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

```
          Estimate          Std. Error
K  =   2.4175E-004 +/-   7.8019E-006 ft/min
y0 =   2.1438E+000 +/-   1.8732E-002 ft
```

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:

```
Number of residuals.............. 36
Number of estimated parameters.... 2
Degrees of freedom............... 34
Residual mean.................... 0.002199
Residual standard deviation....... 0.06061
```

565

Residual variance................. 0.003673

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.2	2.15	2.059	0.091041	1
0.2166	2.13	2.0521	0.077927	1
0.2333	2.12	2.0452	0.074831	1
0.25	2.11	2.0383	0.071712	1
0.2666	2.09	2.0315	0.058529	1
0.2833	2.08	2.0246	0.055364	1
0.3	2.07	2.0178	0.052175	1
0.3166	2.05	2.0111	0.038924	1
0.3333	2.04	2.0043	0.03569	1
0.4167	1.98	1.9709	0.0091407	1
0.5	1.93	1.938	-0.0080057	1
0.5833	1.88	1.9057	-0.0257	1
0.6667	1.84	1.8739	-0.033895	1
0.75	1.8	1.8427	-0.042657	1
0.8333	1.76	1.8119	-0.051941	1
0.9167	1.73	1.7817	-0.0517	1
1	1.7	1.752	-0.052	1
1.0833	1.67	1.7228	-0.052795	1
1.1667	1.64	1.694	-0.054042	1
1.25	1.61	1.6658	-0.055803	1
1.3333	1.58	1.638	-0.058035	1
1.4166	1.55	1.6107	-0.060729	1
1.5	1.53	1.5838	-0.053847	1
1.5833	1.5	1.5574	-0.057445	1
1.6667	1.48	1.5315	-0.051452	1
1.75	1.46	1.5059	-0.045923	1
1.8333	1.43	1.4808	-0.05082	1

566

1.9167	1.41	1.4561	-0.046105	1
2	1.39	1.4318	-0.041833	1
2.5	1.27	1.2944	-0.024408	1
3	1.18	1.1702	0.0098261	1
3.5	1.09	1.0579	0.032137	1
4	1.02	0.95633	0.063668	1
4.5	0.95	0.86455	0.085455	1
5	0.89	0.78157	0.10843	1
5.5	0.84	0.70655	0.13345	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

```
         Estimate
   K  =   2.4175E-004 ft/min
   y0 =   2.1438E+000 ft
```

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

567

SE1000B
Environmental Logger
12-Aug 8:42

~~P-7~~ MW-32 JH 12/19/97

Unit# 331 Test# 2

INPUT 1:00 Level (F) TOC

Reference 18.79
Scale factor 9.97
Offset 0.03

Step# 0 10-Aug 13:28
Step# 1 10-Aug 14:18

MW-32
~~P-7~~

Time	Slug In	Slug Out
0	18.79	18.53
0.0033	18.79	18.53
0.0066	18.78	18.67
0.0099	18.79	18.92
0.0133	18.79	19.22
0.0166	18.78	19.26
0.02	18.36	19.31
0.0233	18.14	19.53
0.0266	17.62	19.83
0.03	17.36	20.08
0.0333	16.95	20.27
0.05	16.56	20.5
0.0666	16.76	20.41
0.0833	16.64	20.38
0.1	16.73	20.36
0.1166	16.75	20.34
0.1333	16.72	20.33
0.15	16.77	20.31
0.1666	16.78	20.3
0.1833	16.74	20.3
0.2	16.95	20.28
0.2166	16.81	20.24
0.2333	16.83	20.25
0.25	16.86	20.24
0.2666	16.86	20.23
0.2833	16.88	20.22
0.3	16.91	20.21
0.3166	16.9	20.19
0.3333	16.91	20.18
0.4167	16.98	20.14
0.5	17.03	20.1
0.5833	17.09	20.06
0.6667	17.13	20.03
0.75	17.18	19.99
0.8333	17.23	19.96
0.9167	17.27	19.93
1	17.31	19.9
1.0833	17.35	19.88
1.1667	17.39	19.85
1.25	17.43	19.82
1.3333	17.47	19.8
1.4166	17.5	19.77
1.5	17.53	19.75
1.5833	17.57	19.72
1.6667	17.59	19.7

MW-32
~~P-7~~

Time	Slug In	Slug Out
1.75	17.62	19.68
1.8333	17.65	19.65
1.9167	17.68	19.63
2	17.7	19.62
2.5	17.86	19.51
3	18	19.42
3.5	18.1	19.34
4	18.17	19.26
4.5	18.22	19.2
5	18.26	19.15
5.5	18.29	19.1
6	18.32	19.06
6.5	18.33	19.02
7	18.35	18.99
7.5	18.36	18.97
8	18.38	18.93
8.5	18.39	18.91
9	18.39	18.89
9.5	18.4	18.87
10	18.41	18.85
11	18.42	18.83
12	18.43	18.8
13	18.44	18.78
14	18.45	18.78
15	18.46	18.76
16	18.42	18.74
17	18.46	18.73
18	18.47	18.72
19	18.47	18.71
20	18.48	18.7
21	18.48	18.69
22	18.49	18.69
23	18.49	18.68
24	18.49	18.68
25	18.49	18.67
26	18.49	18.67
27	18.5	18.66
28	18.5	18.65
29	18.5	18.64
30	18.5	18.64
31	18.5	18.64
32	18.5	18.64
33	18.5	18.63
34	18.51	18.63
35	18.5	18.63

MW-32
~~P-7~~

Time	Slug In	Slug Out
36	18.51	18.63
37	18.51	18.63
38	18.51	18.63
39	18.51	18.63
40	18.51	18.63
41	18.51	18.62
42	18.51	18.62
43	18.51	18.62
44	18.51	18.62
45	18.51	18.61
46	18.52	18.61
47	18.52	18.61
48	18.52	18.61
49	18.53	18.61
50	18.53	18.6

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 2.0

Developed by Glenn M. Duffield

10/24/97 17:47:26

==

TEST DESCRIPTION

Data set........... MW33ASI.DAT
Output file........ MW33ASI.TXT
Data set title..... MW-33A SLUG IN
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/23/97

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 3.27
   Radius of well casing............ 0.0833
   Radius of wellbore............... 0.25
   Aquifer saturated thickness...... 33.33
   Well screen length............... 10
   Static height of water in well... 33.33

```
   Gravel pack porosity............. 0
   Effective well casing radius..... 0.0833
   Effective wellbore radius........ 0.25
   Log(Re/Rw)....................... 3.543
   Constants A, B and C............. 0.000 ,  0.000,  2.297
   No. of observations.............. 63
```

==

ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

```
           Estimate          Std.  Error
   K  =   4.1901E-004 +/-   1.7190E-005 ft/min
   y0 =   1.6283E+000 +/-   1.7949E-002 ft
```

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:

```
   Number of residuals.............. 39
   Number of estimated parameters.... 2
   Degrees of freedom............... 37
   Residual mean.................... 0.0007539
   Residual standard deviation....... 0.06335
```

Residual variance................. 0.004013

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0666	1.63	1.5918	0.038224	1
0.0833	1.61	1.5827	0.02726	1
0.1	1.64	1.5738	0.066244	1
0.1166	1.61	1.5649	0.045123	1
0.1333	1.59	1.556	0.034006	1
0.15	1.43	1.5472	-0.11716	1
0.1666	1.85	1.5384	0.31157	1
0.1833	1.52	1.5297	-0.0097	1
0.2	1.51	1.521	-0.011017	1
0.2166	1.51	1.5124	-0.0024351	1
0.2333	1.49	1.5039	-0.01385	1
0.25	1.47	1.4953	-0.025314	1
0.2666	1.46	1.4869	-0.026877	1
0.2833	1.45	1.4784	-0.028437	1
0.3	1.44	1.47	-0.030045	1
0.3166	1.43	1.4618	-0.031751	1
0.3333	1.42	1.4535	-0.033454	1
0.4167	1.37	1.4127	-0.042717	1
0.5	1.33	1.3732	-0.043169	1
0.5833	1.29	1.3347	-0.044728	1
0.6667	1.26	1.2973	-0.037319	1
0.75	1.22	1.261	-0.041001	1
0.8333	1.19	1.2257	-0.0357	1
0.9167	1.16	1.1913	-0.031347	1
1	1.13	1.158	-0.027996	1
1.0833	1.1	1.1256	-0.025578	1
1.1667	1.07	1.094	-0.024031	1

571

1.25	1.05	1.0634	-0.013404	1
1.3333	1.03	1.0336	-0.003635	1
1.4166	1	1.0047	-0.004699	1
1.5	0.98	0.97654	0.0034602	1
1.5833	0.95	0.9492	0.00079786	1
1.6667	0.93	0.9226	0.0074016	1
1.75	0.91	0.89677	0.013229	1
1.8333	0.89	0.87167	0.018334	1
1.9167	0.87	0.84724	0.022764	1
2	0.85	0.82352	0.026482	1
2.5	0.75	0.69447	0.055526	1
3	0.65	0.58565	0.064349	1

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

572

```
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
```

A Q T E S O L V   R E S U L T S
Version 2.0

Developed by Glenn M. Duffield

10/24/97 17:48:08

==

TEST DESCRIPTION

Data set........... MW33ASO.DAT
Output file........ MW33ASO.TXT
Data set title..... MW-33A SLUG OUT
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/23/97

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 2.09
   Radius of well casing............ 0.0833
   Radius of wellbore............... 0.25
   Aquifer saturated thickness...... 33.33
   Well screen length............... 10
   Static height of water in well... 33.33

573

Gravel pack porosity............ 0
Effective well casing radius..... 0.0833
Effective wellbore radius........ 0.25
Log(Re/Rw)...................... 3.543
Constants A, B and C............ 0.000 , 0.000, 2.297
No. of observations............. 69

==

ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error	
K =	3.7157E-004	+/-	9.4240E-006	ft/min
y0 =	1.6594E+000	+/-	1.0638E-002	ft

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 38
Number of estimated parameters.... 2
Degrees of freedom................ 36
Residual mean..................... 0.000661
Residual standard deviation....... 0.03689

Residual variance................. 0.001361

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0833	1.7	1.6182	0.08182	1
0.1	1.68	1.61	0.069968	1
0.1166	1.67	1.602	0.068027	1
0.1333	1.65	1.5939	0.056093	1
0.15	1.63	1.5859	0.044118	1
0.1666	1.61	1.5779	0.032056	1
0.1833	1.58	1.57	0.010001	1
0.2	1.56	1.5621	-0.0020936	1
0.2166	1.55	1.5543	-0.0042752	1
0.2333	1.53	1.5464	-0.016449	1
0.25	1.52	1.5387	-0.018663	1
0.2666	1.51	1.531	-0.020961	1
0.2833	1.5	1.5233	-0.023253	1
0.3	1.49	1.5156	-0.025583	1
0.3166	1.48	1.508	-0.027997	1
0.3333	1.47	1.5004	-0.030404	1
0.4167	1.43	1.4631	-0.033053	1
0.5	1.39	1.4267	-0.036675	1
0.5833	1.35	1.3912	-0.041201	1
0.6667	1.32	1.3566	-0.036568	1
0.75	1.29	1.3228	-0.032837	1
0.8333	1.25	1.2899	-0.039946	1
0.9167	1.22	1.2578	-0.037833	1
1	1.2	1.2266	-0.026558	1
1.0833	1.17	1.1961	-0.02606	1
1.1667	1.14	1.1663	-0.026285	1
1.25	1.12	1.1373	-0.017286	1

1.3333	1.1	1.109	-0.0090075	1
1.4166	1.07	1.0814	-0.011432	1
1.5	1.05	1.0545	-0.004511	1
1.5833	1.03	1.0283	0.001709	1
1.6667	1.01	1.0027	0.0073074	1
1.75	0.99	0.97776	0.012239	1
1.8333	0.97	0.95345	0.016551	1
1.9167	0.95	0.92971	0.020286	1
2	0.93	0.9066	0.023403	1
2.5	0.83	0.77943	0.05057	1
3	0.75	0.6701	0.079899	1

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

576

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S

Version 2.0

Developed by Glenn M. Duffield
(c) 1993, 1994 Geraghty & Miller, Inc.

10/24/97 17:48:46

==

TEST DESCRIPTION

Data set........... MW33BSI.DAT
Output file........ MW33BSI.TXT
Data set title..... MW-33B SLUG IN
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/23/97

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.06
   Radius of well casing............ 0.0833
   Radius of wellbore............... 0.25
   Aquifer saturated thickness...... 33.33
   Well screen length............... 10
   Static height of water in well... 33.33

577

```
   Gravel pack porosity............ 0
   Effective well casing radius..... 0.0833
   Effective wellbore radius........ 0.25
   Log(Re/Rw)...................... 3.543
   Constants A, B and C............ 0.000 ,  0.000,  2.297
   No. of observations............. 69
```

==

ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
K =	2.6581E-004	+/-	7.7397E-006 ft/min
y0 =	6.7691E-001	+/-	5.2547E-003 ft

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:

```
   Number of residuals.............. 36
   Number of estimated parameters.... 2
   Degrees of freedom............... 34
   Residual mean.................... 0.0005759
   Residual standard deviation....... 0.017
```

578

Residual variance................ 0.0002888

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.1833	0.66	0.6506	0.0093996	1
0.2	0.68	0.64826	0.031745	1
0.2166	0.67	0.64593	0.024068	1
0.2333	0.66	0.6436	0.016396	1
0.25	0.66	0.64128	0.018716	1
0.2666	0.65	0.63899	0.011014	1
0.2833	0.65	0.63668	0.013317	1
0.3	0.64	0.63439	0.0056122	1
0.3166	0.64	0.63211	0.0078853	1
0.3333	0.64	0.62984	0.010164	1
0.4167	0.62	0.61858	0.0014207	1
0.5	0.6	0.60754	-0.0075367	1
0.5833	0.59	0.59669	-0.0066913	1
0.6667	0.58	0.58603	-0.0060268	1
0.75	0.56	0.57557	-0.015565	1
0.8333	0.55	0.56529	-0.015291	1
0.9167	0.54	0.55519	-0.015187	1
1	0.53	0.54528	-0.015276	1
1.0833	0.52	0.53554	-0.015542	1
1.1667	0.51	0.52597	-0.015971	1
1.25	0.5	0.51658	-0.016582	1
1.3333	0.49	0.50736	-0.01736	1
1.4166	0.48	0.4983	-0.018303	1
1.5	0.48	0.4894	-0.0093967	1
1.5833	0.47	0.48066	-0.01066	1
1.6667	0.46	0.47207	-0.01207	1
1.75	0.45	0.46364	-0.013642	1

1.8333	0.44	0.45537	-0.015366	1
1.9167	0.44	0.44723	-0.007227	1
2	0.43	0.43924	-0.0092434	1
2.5	0.39	0.39423	-0.0042298	1
3	0.36	0.35383	0.0061708	1
3.5	0.33	0.31757	0.012431	1
4	0.31	0.28502	0.024976	1
4.5	0.29	0.25582	0.034185	1
5	0.27	0.2296	0.040401	1

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

580

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 2.0

Developed by Glenn M. Duffield

10/23/97 14:11:49

==

TEST DESCRIPTION

Data set........... MW33BSO.DAT
Output file........ MW33BSO.OUT
Data set title..... MW-33B SLUG OUT
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/23/97

Units of Measurement
Length.......... ft
Time............ min

Test Well Data
Initial displacement in well..... 0.84
Radius of well casing............ 0.0833
Radius of wellbore............... 0.25
Aquifer saturated thickness...... 33.33
Well screen length............... 10
Static height of water in well... 33.33

581

```
   Gravel pack porosity............. 0
   Effective well casing radius..... 0.0833
   Effective wellbore radius........ 0.25
   Log(Re/Rw)....................... 3.543
   Constants A, B and C............. 0.000 ,  0.000,  2.297
   No. of observations.............. 56
```

===

ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

===

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

```
          Estimate         Std. Error
   K  =   4.6318E-004 +/-  1.0875E-005 ft/min
   y0 =   5.9615E-001 +/-  4.3087E-003 ft
```

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:

```
   Number of residuals.............. 44
   Number of estimated parameters.... 2
   Degrees of freedom............... 42
   Residual mean.................... 0.0006397
   Residual standard deviation....... 0.01614
```

582

Residual variance................ 0.0002606

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.05	0.64	0.58503	0.054975	1
0.0666	0.62	0.58138	0.038622	1
0.0833	0.61	0.57773	0.032269	1
0.1	0.59	0.57411	0.015893	1
0.1166	0.58	0.57053	0.0094729	1
0.1333	0.59	0.56695	0.023052	1
0.15	0.57	0.56339	0.0066079	1
0.1666	0.56	0.55988	0.00012079	1
0.1833	0.55	0.55637	-0.0063673	1
0.2	0.55	0.55288	-0.0028774	1
0.2166	0.54	0.54943	-0.00943	1
0.2333	0.53	0.54598	-0.015984	1
0.25	0.53	0.54256	-0.012559	1
0.2666	0.53	0.53918	-0.0091759	1
0.2833	0.52	0.53579	-0.015794	1
0.3	0.52	0.53243	-0.012433	1
0.3166	0.51	0.52911	-0.019113	1
0.3333	0.51	0.52579	-0.015794	1
0.4167	0.49	0.50953	-0.019528	1
0.5	0.48	0.49378	-0.013784	1
0.5833	0.46	0.47853	-0.018526	1
0.6667	0.45	0.46372	-0.013723	1
0.75	0.44	0.44939	-0.009394	1
0.8333	0.42	0.43551	-0.015508	1
0.9167	0.41	0.42204	-0.012035	1
1	0.4	0.40899	-0.0089945	1
1.0833	0.39	0.39636	-0.0063568	1

583

1.1667	0.38	0.3841	-0.0040952	1
1.25	0.37	0.37223	-0.0022269	1
1.3333	0.36	0.36073	-0.00072529	1
1.4166	0.35	0.34958	0.00042091	1
1.5	0.34	0.33876	0.0012355	1
1.5833	0.33	0.3283	0.0017031	1
1.6667	0.32	0.31814	0.0018592	1
1.75	0.31	0.30831	0.0016896	1
1.8333	0.3	0.29878	0.0012162	1
1.9167	0.29	0.28954	0.00045936	1
2	0.29	0.28059	0.009406	1
2.5	0.24	0.23241	0.0075878	1
3	0.21	0.1925	0.017496	1
3.5	0.17	0.15945	0.010552	1
4	0.15	0.13207	0.017931	1
4.5	0.12	0.10939	0.010609	1
5	0.1	0.090607	0.0093931	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

Estimate
K = 4.6318E-004 ft/min
y0 = 5.9615E-001 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

584

SE1000B
Environmental Logger
12-Aug 8:46

~~P-6S~~ MW-34S JH 12/19/97

Unit# 331 Test# 3

INPUT 1:00 Level (F) TOC

Reference 6.44
Scale factor 9.97
Offset 0.03

Step# 0 10-Aug 15:27
Step# 1 10-Aug 15:58

MW-34S
~~P-6S~~

Time	Slug In	Slug Out
0	6.46	6.49
0.0033	6.46	6.64
0.0066	6.46	7.35
0.0099	6.47	6.86
0.0133	6.21	6.03
0.0166	5.83	5.87
0.02	5.92	8.17
0.0233	5.33	6.79
0.0266	4.97	6.21
0.03	4.29	7.15
0.0333	4.26	6.75
0.05	4.31	8.06
0.0666	4.97	8.52
0.0833	5.53	8.25
0.1	5.2	8.02
0.1166	5.21	7.87
0.1333	5.29	7.75
0.15	5.37	7.61
0.1666	5.44	7.56
0.1833	5.49	7.51
0.2	5.53	7.46
0.2166	5.55	7.41
0.2333	5.62	7.37
0.25	5.62	7.34
0.2666	5.64	7.3
0.2833	5.69	7.28
0.3	5.71	7.25
0.3166	5.75	7.23
0.3333	5.76	7.21
0.4167	5.79	7.13
0.5	5.87	7.07
0.5833	5.92	7.03
0.6667	5.94	7
0.75	5.97	6.97
0.8333	6.01	6.94
0.9167	6.04	6.92
1	6.06	6.9
1.0833	6.08	6.88
1.1667	6.09	6.87
1.25	6.11	6.85
1.3333	6.12	6.84
1.4166	6.14	6.83
1.5	6.15	6.82
1.5833	6.16	6.81

MW-34S
~~P-6S~~

Time	Slug In	Slug Out
1.6667	6.16	6.8
1.75	6.18	6.79
1.8333	6.21	6.78
1.9167	6.19	6.78
2	6.2	6.77
2.5	6.23	6.74
3	6.25	6.72
3.5	6.28	6.69
4	6.29	6.67
4.5	6.31	6.66
5	6.32	6.65
5.5	6.32	6.64
6	6.33	6.63
6.5	6.34	6.62
7	6.36	6.61
7.5	6.36	6.61
8	6.37	6.6
8.5	6.38	6.59
9	6.38	6.59
9.5	6.38	6.58
10	6.38	6.58
11	6.4	6.57
12	6.41	6.56
13	6.41	6.55
14	6.42	6.55
15	6.43	6.55
16	6.43	6.54
17	6.43	6.54
18	6.44	6.53
19	6.44	6.53
20	6.45	6.53
21	6.45	6.53
22	6.45	6.52
23	6.45	6.52
24	6.46	6.52
25	6.46	6.52
26	6.46	6.51
27	6.46	6.51
28	6.46	6.51
29	6.46	6.51
30	6.46	6.51
31	6.46	6.51
32		6.51
33		6.51

MW-34S
~~P-6S~~

Time	Slug In	Slug Out
34		6.51
35		6.51
36		6.5
37		6.5
38		6.5
39		6.5
40		6.5
41		6.5
42		6.5
43		6.5
44		6.5
45		6.5

SE1000B
Environmental Logger
17-Oct 8:19

~~P-6D~~ MW-34D JH 2/19/97

Unit# 331 Test# 3

INPUT 1:00 Level (F) TOC

Reference 12.73
Scale factor 9.97
Offset 0.03

Step# 0 14-Oct 8:39
Step# 1 14-Oct 11:57

MW-34D
~~P-6D~~

Time	Slug In	Slug Out
0	12.72	11.57
0.0033	12.72	11.57
0.0066	12.72	11.93
0.0099	12.72	13.24
0.0133	12.71	13.56
0.0166	12.7	13.25
0.02		13.46
0.0233	12.24	12.72
0.0266	11.07	12.76
0.03	11.41	12.51
0.0333	11.58	12.66
0.05	11.66	12.72
0.0666	11.61	12.73
0.0833	11.59	12.72
0.1	11.57	12.71
0.1166	11.59	12.7
0.1333	11.64	12.63
0.15	11.61	12.7
0.1666	11.64	12.69
0.1833	11.61	12.69
0.2	11.62	12.69
0.2166	11.62	12.69
0.2333	11.62	12.69
0.25	11.62	12.69
0.2666	11.62	12.69
0.2833	11.62	12.69
0.3	11.62	12.69
0.3166	11.62	12.68
0.3333	11.62	12.68
0.4167	11.62	12.68
0.5	11.62	12.68
0.5833	11.62	12.68
0.6667	11.63	12.68
0.75	11.62	12.68
0.8333	11.62	12.68
0.9167	11.62	12.68
1	11.62	12.68
1.0833	11.62	12.68
1.1667	11.62	12.68
1.25	11.62	12.68
1.3333	11.62	12.68
1.4166	11.62	12.68
1.5	11.62	12.68

MW-34D
~~P-6D~~

Time	Slug In	Slug Out
1.5833	11.62	12.68
1.6667	11.62	12.68
1.75	11.62	12.68
1.8333	11.62	12.68
1.9167	11.62	12.68
2	11.62	12.68
2.5	11.62	12.67
3	11.62	12.67
3.5	11.62	12.67
4	11.62	12.67
4.5	11.62	12.67
5	11.62	12.67
5.5	11.62	12.67
6	11.62	12.67
6.5	11.62	12.67
7	11.62	12.67
7.5	11.62	12.67
8	11.62	12.67
8.5	11.62	12.67
9	11.62	12.67
9.5	11.62	12.67
10	11.62	12.67
12	11.62	12.67
14	11.62	12.67
16	11.62	12.67
18	11.62	12.67
20	11.62	12.67
22	11.62	12.67
24	11.62	12.67
26	11.62	12.67
28	11.61	12.67
30	11.61	12.67
32	11.61	12.67
34	11.61	12.67
36	11.61	12.66
38	11.61	12.67
40	11.61	12.66
42	11.61	12.66
44	11.61	12.66
46	11.61	12.66
48	11.61	12.66
50	11.61	12.66
52	11.61	12.66

MW-34D
~~P-6D~~

Time	Slug In	Slug Out
54	11.61	12.66
56	11.61	12.66
58	11.61	12.66
60	11.61	12.66
62	11.6	12.66
64	11.6	12.66
66	11.6	12.66
68	11.6	12.66
70	11.6	12.65
72	11.6	12.66
74	11.6	12.66
76	11.6	12.66
78	11.6	12.66
80	11.6	12.6
82	11.6	12.65
84	11.6	12.65
86	11.6	12.65
88	11.6	12.65
90	11.6	12.65
92	11.6	12.65
94	11.6	12.65
96	11.6	12.65
98	11.6	12.65
100	11.59	12.65
110	11.59	12.64
120	11.59	12.64
130	11.58	12.64
140	11.58	12.64
150	11.58	12.63
160	11.58	12.63
170	11.58	12.63
180	11.58	12.63
190	11.57	12.62
200		12.62
210		12.62
220		12.61
230		12.61
240		12.61

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 2.0

Developed by Glenn M. Duffield

10/23/97 15:30:05

==

TEST DESCRIPTION

Data set........... MW35SI.DAT
Output file........ MW35AQSI.OUT
Data set title..... MW-35A SLUG IN
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 9/03/97

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 1.46
   Radius of well casing............ 0.0833
   Radius of wellbore............... 0.25
   Aquifer saturated thickness...... 24.58
   Well screen length............... 10
   Static height of water in well... 24.58

```
   Gravel pack porosity............. 0
   Effective well casing radius..... 0.0833
   Effective wellbore radius........ 0.25
   Log(Re/Rw)....................... 3.365
   Constants A, B and C............. 0.000 ,  0.000,  2.297
   No. of observations.............. 200

==============================================================================
                              ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

==============================================================================
                    RESULTS FROM STATISTICAL CURVE MATCHING


STATISTICAL MATCH PARAMETER ESTIMATES

           Estimate          Std. Error
   K  =   2.0390E-007 +/-   4.4986E-009 ft/min
   y0 =   1.0107E+000 +/-   3.1608E-004 ft


ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
   Number of residuals.............. 194
   Number of estimated parameters.... 2
   Degrees of freedom............... 192
   Residual mean.................... -2.936E-009
   Residual standard deviation....... 0.002718
```

588

Residual variance................ 7.39E-006

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.1666	1.01	1.0107	-0.00065113	1
0.1833	1.01	1.0106	-0.00064819	1
0.2	1.01	1.0106	-0.00064524	1
0.2166	1.01	1.0106	-0.00064231	1
0.2333	1.01	1.0106	-0.00063936	1
0.25	1.01	1.0106	-0.00063641	1
0.2666	1.01	1.0106	-0.00063348	1
0.2833	1.01	1.0106	-0.00063054	1
0.3	1.01	1.0106	-0.00062759	1
0.3166	1.01	1.0106	-0.00062466	1
0.3333	1.01	1.0106	-0.00062171	1
0.4167	1.01	1.0106	-0.00060699	1
0.5	1.01	1.0106	-0.00059229	1
0.5833	1.01	1.0106	-0.00057759	1
0.6667	1.01	1.0106	-0.00056287	1
0.75	1.01	1.0105	-0.00054817	1
0.8333	1.01	1.0105	-0.00053346	1
0.9167	1.01	1.0105	-0.00051875	1
1	1.01	1.0105	-0.00050405	1
1.0833	1.01	1.0105	-0.00048934	1
1.1667	1.01	1.0105	-0.00047463	1
1.25	1.01	1.0105	-0.00045993	1
1.3333	1.01	1.0104	-0.00044523	1
1.4166	1.01	1.0104	-0.00043053	1
1.5	1.01	1.0104	-0.00041581	1
1.5833	1.01	1.0104	-0.00040111	1
1.6667	1.01	1.0104	-0.00038639	1

589

1.75	1.01	1.0104	-0.00037169	1
1.8333	1.01	1.0104	-0.00035699	1
1.9167	1.01	1.0103	-0.00034228	1
2	1.01	1.0103	-0.00032758	1
2.5	1.01	1.0102	-0.00023936	1
3	1.01	1.0102	-0.00015115	1
3.5	1.01	1.0101	-6.294E-005	1
4	1.01	1.01	2.5258E-005	1
4.5	1.01	1.0099	0.00011345	1
5	1.01	1.0098	0.00020163	1
5.5	1.01	1.0097	0.00028981	1
6	1.01	1.0096	0.00037797	1
6.5	1.01	1.0095	0.00046613	1
7	1.01	1.0094	0.00055428	1
7.5	1.01	1.0094	0.00064243	1
8	1.01	1.0093	0.00073056	1
8.5	1.01	1.0092	0.00081869	1
9	1.01	1.0091	0.00090681	1
9.5	1.01	1.009	0.00099493	1
10	1.01	1.0089	0.001083	1
11	1.01	1.0087	0.0012592	1
12	1.01	1.0086	0.0014354	1
13	1.01	1.0084	0.0016115	1
14	1.01	1.0082	0.0017876	1
15	1.01	1.008	0.0019637	1
16	1.01	1.0079	0.0021397	1
17	1.01	1.0077	0.0023157	1
18	1.01	1.0075	0.0024917	1
19	1.01	1.0073	0.0026676	1
20	1.01	1.0072	0.0028435	1
21	1.01	1.007	0.0030194	1
22	1.01	1.0068	0.0031953	1
23	1.01	1.0066	0.0033711	1
24	1.01	1.0065	0.0035469	1

25	1.01	1.0063	0.0037226	1
26	1.01	1.0061	0.0038984	1
27	1.01	1.0059	0.0040741	1
28	1.01	1.0058	0.0042497	1
29	1	1.0056	-0.0055746	1
30	1	1.0054	-0.005399	1
31	1.01	1.0052	0.0047765	1
32	1.01	1.005	0.0049521	1
33	1	1.0049	-0.0048724	1
34	1	1.0047	-0.0046969	1
35	1	1.0045	-0.0045215	1
36	1	1.0043	-0.0043461	1
37	1	1.0042	-0.0041707	1
38	1	1.004	-0.0039953	1
39	1	1.0038	-0.00382	1
40	1	1.0036	-0.0036447	1
41	1	1.0035	-0.0034694	1
42	1	1.0033	-0.0032942	1
43	1	1.0031	-0.003119	1
44	1	1.0029	-0.0029438	1
45	1	1.0028	-0.0027687	1
46	1	1.0026	-0.0025935	1
47	1	1.0024	-0.0024185	1
48	1	1.0022	-0.0022434	1
49	1	1.0021	-0.0020684	1
50	1	1.0019	-0.0018934	1
51	1	1.0017	-0.0017184	1
52	1	1.0015	-0.0015435	1
53	1	1.0014	-0.0013686	1
54	1	1.0012	-0.0011937	1
55	1	1.001	-0.0010189	1
56	1	1.0008	-0.00084408	1
57	1	1.0007	-0.0006693	1
58	1	1.0005	-0.00049455	1

59	1	1.0003	-0.00031983	1
60	1	1.0001	-0.00014515	1
61	1	0.99997	2.9509E-005	1
62	1	0.9998	0.00020413	1
63	1	0.99962	0.00037873	1
64	1	0.99945	0.00055329	1
65	1	0.99927	0.00072783	1
66	1	0.9991	0.00090233	1
67	1	0.99892	0.0010768	1
68	1	0.99875	0.0012512	1
69	1	0.99857	0.0014257	1
70	1	0.9984	0.0016	1
71	1	0.99823	0.0017744	1
72	1	0.99805	0.0019487	1
73	1	0.99788	0.002123	1
74	1	0.9977	0.0022973	1
75	1	0.99753	0.0024715	1
76	1	0.99735	0.0026457	1
77	1	0.99718	0.0028199	1
78	1	0.99701	0.002994	1
79	1	0.99683	0.0031681	1
80	1	0.99666	0.0033422	1
81	1	0.99648	0.0035162	1
82	1	0.99631	0.0036903	1
83	1	0.99614	0.0038642	1
84	1	0.99596	0.0040382	1
85	1	0.99579	0.0042121	1
86	1	0.99561	0.004386	1
87	1	0.99544	0.0045599	1
88	1	0.99527	0.0047337	1
89	1	0.99509	0.0049075	1
90	1	0.99492	0.0050813	1
91	0.99	0.99474	-0.004745	1
92	0.99	0.99457	-0.0045712	1

93	0.99	0.9944	-0.0043976	1
94	0.99	0.99422	-0.0042239	1
95	0.99	0.99405	-0.0040503	1
96	0.99	0.99388	-0.0038767	1
97	0.99	0.9937	-0.0037031	1
98	0.99	0.99353	-0.0035296	1
99	0.99	0.99336	-0.0033561	1
100	0.99	0.99318	-0.0031826	1
101	0.99	0.99301	-0.0030092	1
102	0.99	0.99284	-0.0028358	1
103	0.99	0.99266	-0.0026624	1
104	0.99	0.99249	-0.0024891	1
105	0.99	0.99232	-0.0023157	1
106	0.99	0.99214	-0.0021424	1
107	0.99	0.99197	-0.0019692	1
108	0.99	0.9918	-0.001796	1
109	0.99	0.99162	-0.0016228	1
110	0.99	0.99145	-0.0014496	1
111	0.99	0.99128	-0.0012765	1
112	0.99	0.9911	-0.0011033	1
113	0.99	0.99093	-0.00093027	1
114	0.99	0.99076	-0.00075722	1
115	0.99	0.99058	-0.00058421	1
116	0.99	0.99041	-0.00041122	1
117	0.99	0.99024	-0.00023826	1
118	0.99	0.99007	-6.5338E-005	1
119	0.99	0.98989	0.00010756	1
120	0.99	0.98972	0.00028042	1
121	0.99	0.98955	0.00045326	1
122	0.99	0.98937	0.00062607	1
123	0.99	0.9892	0.00079884	1
124	0.99	0.98903	0.00097159	1
125	0.99	0.98886	0.0011443	1
126	0.99	0.98868	0.001317	1

127	0.99	0.98851	0.0014896	1
128	0.99	0.98834	0.0016623	1
129	0.99	0.98817	0.0018349	1
130	0.99	0.98799	0.0020074	1
131	0.99	0.98782	0.00218	1
132	0.99	0.98765	0.0023525	1
133	0.99	0.98748	0.0025249	1
134	0.99	0.9873	0.0026974	1
135	0.99	0.98713	0.0028698	1
136	0.99	0.98696	0.0030422	1
137	0.99	0.98679	0.0032145	1
138	0.99	0.98661	0.0033869	1
139	0.99	0.98644	0.0035591	1
140	0.99	0.98627	0.0037314	1
141	0.99	0.9861	0.0039036	1
142	0.99	0.98592	0.0040758	1
143	0.99	0.98575	0.004248	1
144	0.99	0.98558	0.0044202	1
145	0.98	0.98541	-0.0054077	1
146	0.98	0.98524	-0.0052356	1
147	0.99	0.98506	0.0049364	1
148	0.99	0.98489	0.0051084	1
149	0.98	0.98472	-0.0047196	1
150	0.98	0.98455	-0.0045476	1
151	0.98	0.98438	-0.0043757	1
152	0.98	0.9842	-0.0042038	1
153	0.98	0.98403	-0.0040319	1
154	0.98	0.98386	-0.0038601	1
155	0.98	0.98369	-0.0036883	1
156	0.98	0.98352	-0.0035165	1
157	0.98	0.98334	-0.0033447	1

==

RESULTS FROM VISUAL CURVE MATCHING

594

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
K =	2.0390E-007 ft/min
y0 =	1.0107E+000 ft

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 2.0

Developed by Glenn M. Duffield

10/24/97 17:05:34

==

TEST DESCRIPTION

Data set........... MW35SO.DAT
Output file........ MW35SO.OUT
Data set title..... MW-35A SLUG OUT
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 9/04/97

Units of Measurement
   Length.......... ft
   Time............ min

Test Well Data
   Initial displacement in well..... 2.3
   Radius of well casing............ 0.0833
   Radius of wellbore............... 0.25
   Aquifer saturated thickness...... 24.58
   Well screen length............... 10
   Static height of water in well... 24.58

596

Gravel pack porosity............. 0
Effective well casing radius..... 0.0833
Effective wellbore radius........ 0.25
Log(Re/Rw)....................... 3.365
Constants A, B and C............. 0.000 , 0.000, 2.297
No. of observations.............. 200

==

ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
K =	7.9213E-008	+/-	1.3926E-008 ft/min
y0 =	9.7761E-001	+/-	8.8735E-004 ft

ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals.............. 191
Number of estimated parameters.... 2
Degrees of freedom............... 189
Residual mean.................... 1.544E-008
Residual standard deviation....... 0.007799

Residual variance................ 6.083E-005

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0833	1.05	0.9776	0.072396	1
0.1	1.03	0.9776	0.052397	1
0.1166	0.98	0.9776	0.0023977	1
0.1333	0.97	0.9776	-0.0076012	1
0.15	0.98	0.9776	0.0023999	1
0.1666	0.99	0.9776	0.012401	1
0.1833	0.99	0.9776	0.012402	1
0.2	0.98	0.9776	0.0024033	1
0.2166	0.98	0.9776	0.0024044	1
0.2333	0.98	0.97759	0.0024055	1
0.25	0.98	0.97759	0.0024066	1
0.2666	0.98	0.97759	0.0024077	1
0.2833	0.98	0.97759	0.0024088	1
0.3	0.98	0.97759	0.0024099	1
0.3166	0.98	0.97759	0.002411	1
0.3333	0.98	0.97759	0.0024121	1
0.4167	0.98	0.97758	0.0024176	1
0.5	0.98	0.97758	0.0024231	1
0.5833	0.98	0.97757	0.0024287	1
0.6667	0.98	0.97757	0.0024342	1
0.75	0.98	0.97756	0.0024397	1
0.8333	0.98	0.97755	0.0024453	1
0.9167	0.98	0.97755	0.0024508	1
1	0.98	0.97754	0.0024563	1
1.0833	0.98	0.97754	0.0024618	1
1.1667	0.98	0.97753	0.0024674	1
1.25	0.98	0.97753	0.0024729	1

598

1.3333	0.98	0.97752	0.0024784	1
1.4166	0.98	0.97752	0.0024839	1
1.5	0.98	0.97751	0.0024895	1
1.5833	0.98	0.97751	0.002495	1
1.6667	0.98	0.9775	0.0025005	1
1.75	0.98	0.97749	0.0025061	1
1.8333	0.98	0.97749	0.0025116	1
1.9167	0.98	0.97748	0.0025171	1
2	0.98	0.97748	0.0025226	1
2.5	0.98	0.97744	0.0025558	1
3	0.98	0.97741	0.0025889	1
3.5	0.98	0.97738	0.0026221	1
4	0.98	0.97734	0.0026553	1
4.5	0.98	0.97731	0.0026884	1
5	0.98	0.97728	0.0027216	1
5.5	0.98	0.97725	0.0027547	1
6	0.98	0.97721	0.0027879	1
6.5	0.98	0.97718	0.002821	1
7	0.98	0.97715	0.0028542	1
7.5	0.98	0.97711	0.0028873	1
8	0.98	0.97708	0.0029205	1
8.5	0.98	0.97705	0.0029536	1
9	0.97	0.97701	-0.0070133	1
9.5	0.97	0.97698	-0.0069801	1
10	0.97	0.97695	-0.006947	1
11	0.98	0.97688	0.0031193	1
12	0.97	0.97681	-0.0068144	1
13	0.97	0.97675	-0.0067481	1
14	0.97	0.97668	-0.0066819	1
15	0.97	0.97662	-0.0066156	1
16	0.97	0.97655	-0.0065494	1
17	0.97	0.97648	-0.0064831	1
18	0.97	0.97642	-0.0064169	1
19	0.97	0.97635	-0.0063506	1

599

20	0.97	0.97628	-0.0062844	1
21	0.97	0.97622	-0.0062181	1
22	0.97	0.97615	-0.0061519	1
23	0.97	0.97609	-0.0060857	1
24	0.97	0.97602	-0.0060195	1
25	0.97	0.97595	-0.0059532	1
26	0.97	0.97589	-0.005887	1
27	0.97	0.97582	-0.0058208	1
28	0.97	0.97575	-0.0057546	1
29	0.97	0.97569	-0.0056884	1
30	0.97	0.97562	-0.0056222	1
31	0.97	0.97556	-0.005556	1
32	0.97	0.97549	-0.0054898	1
33	0.97	0.97542	-0.0054237	1
34	0.97	0.97536	-0.0053575	1
35	0.97	0.97529	-0.0052913	1
36	0.97	0.97523	-0.0052251	1
37	0.97	0.97516	-0.005159	1
38	0.97	0.97509	-0.0050928	1
39	0.97	0.97503	-0.0050267	1
40	0.97	0.97496	-0.0049605	1
41	0.97	0.97489	-0.0048944	1
42	0.97	0.97483	-0.0048282	1
43	0.97	0.97476	-0.0047621	1
44	0.97	0.9747	-0.004696	1
45	0.97	0.97463	-0.0046298	1
46	0.97	0.97456	-0.0045637	1
47	0.97	0.9745	-0.0044976	1
48	0.97	0.97443	-0.0044315	1
49	0.97	0.97437	-0.0043654	1
50	0.97	0.9743	-0.0042993	1
51	0.97	0.97423	-0.0042332	1
52	0.97	0.97417	-0.0041671	1
53	0.97	0.9741	-0.004101	1

54	0.97	0.97403	-0.0040349	1
55	0.97	0.97397	-0.0039688	1
56	0.97	0.9739	-0.0039027	1
57	0.97	0.97384	-0.0038367	1
58	0.97	0.97377	-0.0037706	1
59	0.97	0.9737	-0.0037045	1
60	0.97	0.97364	-0.0036385	1
61	0.97	0.97357	-0.0035724	1
62	0.97	0.97351	-0.0035064	1
63	0.97	0.97344	-0.0034403	1
64	0.97	0.97337	-0.0033743	1
65	0.97	0.97331	-0.0033082	1
66	0.97	0.97324	-0.0032422	1
67	0.97	0.97318	-0.0031762	1
68	0.97	0.97311	-0.0031101	1
69	0.97	0.97304	-0.0030441	1
70	0.97	0.97298	-0.0029781	1
71	0.97	0.97291	-0.0029121	1
72	0.97	0.97285	-0.0028461	1
73	0.97	0.97278	-0.0027801	1
74	0.97	0.97271	-0.0027141	1
75	0.97	0.97265	-0.0026481	1
76	0.97	0.97258	-0.0025821	1
77	0.97	0.97252	-0.0025161	1
78	0.97	0.97245	-0.0024502	1
79	0.97	0.97238	-0.0023842	1
80	0.97	0.97232	-0.0023182	1
81	0.97	0.97225	-0.0022522	1
82	0.97	0.97219	-0.0021863	1
83	0.97	0.97212	-0.0021203	1
84	0.97	0.97205	-0.0020544	1
85	0.97	0.97199	-0.0019884	1
86	0.97	0.97192	-0.0019225	1
87	0.97	0.97186	-0.0018565	1

88	0.97	0.97179	-0.0017906	1
89	0.97	0.97172	-0.0017247	1
90	0.97	0.97166	-0.0016587	1
91	0.97	0.97159	-0.0015928	1
92	0.97	0.97153	-0.0015269	1
93	0.97	0.97146	-0.001461	1
94	0.97	0.9714	-0.0013951	1
95	0.97	0.97133	-0.0013292	1
96	0.97	0.97126	-0.0012633	1
97	0.97	0.9712	-0.0011974	1
98	0.97	0.97113	-0.0011315	1
99	0.97	0.97107	-0.0010656	1
100	0.97	0.971	-0.00099973	1
101	0.97	0.97093	-0.00093386	1
102	0.97	0.97087	-0.00086799	1
103	0.97	0.9708	-0.00080212	1
104	0.97	0.97074	-0.00073625	1
105	0.97	0.97067	-0.0006704	1
106	0.97	0.9706	-0.00060454	1
107	0.97	0.97054	-0.00053869	1
108	0.97	0.97047	-0.00047285	1
109	0.97	0.97041	-0.00040701	1
110	0.97	0.97034	-0.00034117	1
111	0.97	0.97028	-0.00027534	1
112	0.97	0.97021	-0.00020951	1
113	0.97	0.97014	-0.00014369	1
114	0.97	0.97008	-7.7869E-005	1
115	0.97	0.97001	-1.2055E-005	1
116	0.97	0.96995	5.3755E-005	1
117	0.97	0.96988	0.00011956	1
118	0.97	0.96981	0.00018536	1
119	0.97	0.96975	0.00025116	1
120	0.97	0.96968	0.00031695	1
121	0.97	0.96962	0.00038274	1

602

122	0.97	0.96955	0.00044852	1
123	0.97	0.96949	0.0005143	1
124	0.97	0.96942	0.00058007	1
125	0.97	0.96935	0.00064584	1
126	0.97	0.96929	0.0007116	1
127	0.98	0.96922	0.010777	1
128	0.97	0.96916	0.00084312	1
129	0.97	0.96909	0.00090887	1
130	0.98	0.96903	0.010975	1
131	0.97	0.96896	0.0010404	1
132	0.97	0.96889	0.0011061	1
133	0.97	0.96883	0.0011718	1
134	0.98	0.96876	0.011238	1
135	0.98	0.9687	0.011303	1
136	0.98	0.96863	0.011369	1
137	0.97	0.96857	0.0014347	1
138	0.97	0.9685	0.0015004	1
139	0.97	0.96843	0.0015661	1
140	0.97	0.96837	0.0016318	1
141	0.97	0.9683	0.0016975	1
142	0.98	0.96824	0.011763	1
143	0.98	0.96817	0.011829	1
144	0.97	0.96811	0.0018946	1
145	0.97	0.96804	0.0019603	1
146	0.97	0.96797	0.002026	1
147	0.97	0.96791	0.0020916	1
148	0.98	0.96784	0.012157	1
149	0.97	0.96778	0.002223	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

603

```
         Estimate
K  =   7.9213E-008 ft/min
y0 =   9.7761E-001 ft
```

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

604

SE1000B
Environmental Logger
17-Oct 11:27

P-5 MW-36 JH 12/19/97

Unit#	331 Test#		1
INPUT	1:00 Level	(F)	TOC
Reference	2.5		
Scale factor	9.97		
Offset	0.03		
Step#	0	10-Oct	15:00
Step#	1	10-Oct	15:13

P-5 MW-36

Time	Slug In	Slug Out
0	2.36	2.12
0.0033	2.36	2.09
0.0066	2.36	2.1
0.0099	2.36	2.11
0.0133	2.36	2.45
0.0166	2.32	2.02
0.02	2.31	3.54
0.0233	2.35	4.27
0.0266	2.3	4.89
0.03	2.36	4.84
0.0333	2.24	5.25
0.05	2.18	4.9
0.0666	2.05	4.22
0.0833	1.53	4.26
0.1	1.3	4.14
0.1166	1.15	4.06
0.1333	1.04	4.04
0.15	0.69	3.95
0.1666	0.45	3.96
0.1833	0.03	3.89
0.2	0.12	3.82
0.2166	0.2	3.72
0.2333	0.29	3.67
0.25	0.37	3.61
0.2666	0.44	3.55
0.2833	0.51	3.5
0.3	0.57	3.46
0.3166	0.64	3.41
0.3333	0.69	3.37
0.4167	0.94	3.2
0.5	1.12	3.07
0.5833	1.26	2.94
0.6667	1.37	2.83
0.75	1.46	2.69
0.8333	1.54	2.6
0.9167	1.61	2.55
1	1.67	2.5
1.0833	1.71	2.45
1.1667	1.75	2.41
1.25	1.8	2.38
1.3333	1.83	2.34
1.4166	1.86	2.32
1.5	1.89	2.29
1.5833	1.91	2.27
1.6667	1.94	2.25

P-5 MW-36

Time	Slug In	Slug Out
1.75	1.96	2.23
1.8333	1.98	2.21
1.9167	1.99	2.2
2	2.01	2.18
2.5	2.07	2.11
3	2.11	2.07
3.5	2.13	2.04
4	2.14	2.01
4.5	2.15	1.99
5	2.15	1.98
5.5	2.15	1.96
6	2.15	1.95
6.5	2.15	1.93
7	2.15	1.92
7.5	2.14	1.92
8	2.14	1.91
8.5	2.14	1.9
9	2.14	1.9
9.5	2.14	1.89
10	2.14	1.88
11	2.15	1.87
12	2.14	1.86
13		1.86
14		1.85
15		1.84
16		1.85
17		1.84
18		1.84
19		1.83
20		1.81
21		1.81
22		1.81

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 2.0

Developed by Glenn M. Duffield

10/24/97 17:13:59

==

TEST DESCRIPTION

Data set........... MW37SI.DAT
Output file........ MW37SI.OUT
Data set title..... MW-37 SLUG IN
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/16/97

Units of Measurement
Length.......... ft
Time............ min

Test Well Data
Initial displacement in well..... 2.62
Radius of well casing............ 0.0833
Radius of wellbore............... 0.25
Aquifer saturated thickness...... 26.41
Well screen length............... 10
Static height of water in well... 26.41

```
   Gravel pack porosity............. 0
   Effective well casing radius..... 0.0833
   Effective wellbore radius........ 0.25
   Log(Re/Rw)....................... 3.408
   Constants A, B and C............. 0.000 ,  0.000,  2.297
   No. of observations.............. 34

================================================================================
                                ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

================================================================================
                    RESULTS FROM STATISTICAL CURVE MATCHING


STATISTICAL MATCH PARAMETER ESTIMATES

           Estimate          Std. Error
   K  =   4.3995E-003 +/-   2.2436E-005 ft/min
   y0 =   2.6930E+000 +/-   9.1606E-003 ft


ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
   Number of residuals.............. 20
   Number of estimated parameters.... 2
   Degrees of freedom............... 18
   Residual mean.................... -0.0009125
   Residual standard deviation....... 0.009221
```

607

Residual variance................ 8.502E-005

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0666	2.09	2.1019	-0.011863	1
0.0833	1.97	1.9752	-0.0052147	1
0.1	1.85	1.8562	-0.006198	1
0.1166	1.74	1.745	-0.0050019	1
0.1333	1.64	1.6399	0.00014339	1
0.15	1.55	1.541	0.0089531	1
0.1666	1.46	1.4487	0.01127	1
0.1833	1.37	1.3614	0.0085633	1
0.2	1.29	1.2794	0.010597	1
0.2166	1.21	1.2028	0.0072399	1
0.2333	1.13	1.1303	-0.0002877	1
0.25	1.07	1.0622	0.0078179	1
0.2666	1	0.99855	0.0014482	1
0.2833	0.94	0.93838	0.0016161	1
0.3	0.88	0.88184	-0.0018415	1
0.3166	0.83	0.82901	0.00098546	1
0.3333	0.78	0.77906	0.0009378	1
0.4167	0.56	0.57119	-0.011194	1
0.5	0.4	0.41894	-0.018945	1
0.5833	0.29	0.30728	-0.017277	1

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

```
         Estimate
K  =   4.3995E-003 ft/min
y0 =   2.6930E+000 ft
```

```
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
```

609

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 2.0

Developed by Glenn M. Duffield
(c) 1993, 1994 Geraghty & Miller, Inc.

10/24/97 17:11:09

==

TEST DESCRIPTION

Data set........... MW37SO.DAT
Output file........ MW37SO.OUT
Data set title..... MW-37 SLUG OUT
Company............ GERAGHTY & MILLER, INC.
Project............ TF0320.015
Client............. SLOSS INDUSTRIES
Location........... BIRMINGHAM, ALABAMA
Test date.......... 8/16/97

Units of Measurement
Length.......... ft
Time............ min

Test Well Data
Initial displacement in well..... 2.51
Radius of well casing............ 0.0833
Radius of wellbore............... 0.25
Aquifer saturated thickness...... 26.41
Well screen length............... 10
Static height of water in well... 26.41

610

```
   Gravel pack porosity............ 0
   Effective well casing radius..... 0.0833
   Effective wellbore radius........ 0.25
   Log(Re/Rw)....................... 3.408
   Constants A, B and C............. 0.000 ,  0.000,  2.297
   No. of observations.............. 43

================================================================================
                                ANALYTICAL METHOD

Bouwer-Rice (Confined Aquifer Slug Test)

================================================================================
                     RESULTS FROM STATISTICAL CURVE MATCHING


STATISTICAL MATCH PARAMETER ESTIMATES

           Estimate          Std. Error
   K  =   4.2232E-003 +/-   2.2863E-005 ft/min
   y0 =   2.5246E+000 +/-   5.4013E-003 ft


ANALYSIS OF MODEL RESIDUALS

residual = observed - calculated
weighted residual = residual * weight

Weighted Residual Statistics:
   Number of residuals.............. 35
   Number of estimated parameters.... 2
   Degrees of freedom............... 33
   Residual mean.................... -0.0002142
   Residual standard deviation....... 0.01607
```

611

Residual variance................ 0.0002583

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0033	2.51	2.495	0.014984	1
0.0066	2.47	2.4658	0.0042232	1
0.0099	2.44	2.4369	0.0031197	1
0.0133	2.41	2.4075	0.0025378	1
0.0166	2.45	2.3792	0.070751	1
0.02	2.36	2.3505	0.0094733	1
0.0233	2.31	2.323	-0.012981	1
0.0266	2.27	2.2958	-0.025758	1
0.03	2.25	2.268	-0.018043	1
0.0333	2.22	2.2415	-0.021464	1
0.05	2.1	2.1117	-0.011658	1
0.0666	1.97	1.9901	-0.02008	1
0.0833	1.86	1.8748	-0.014832	1
0.1	1.76	1.7663	-0.0062585	1
0.1166	1.66	1.6646	-0.0045669	1
0.1333	1.56	1.5682	-0.0081698	1
0.15	1.48	1.4774	0.0026447	1
0.1666	1.39	1.3923	-0.0022971	1
0.1833	1.31	1.3117	-0.0016675	1
0.2	1.24	1.2357	0.0042927	1
0.2166	1.17	1.1646	0.005438	1
0.2333	1.1	1.0971	0.0028792	1
0.25	1.04	1.0336	0.0064148	1
0.2666	0.98	0.97408	0.005923	1
0.2833	0.93	0.91767	0.012333	1
0.3	0.87	0.86452	0.0054762	1
0.3166	0.82	0.81475	0.0052508	1

612

0.3333	0.78	0.76757	0.012434	1
0.4167	0.57	0.56981	0.00018989	1
0.5	0.42	0.42316	-0.0031552	1
0.5833	0.31	0.31425	-0.0042456	1
0.6667	0.23	0.23328	-0.0032832	1
0.75	0.17	0.17324	-0.0032419	1
0.8333	0.12	0.12865	-0.0086538	1
0.9167	0.09	0.095507	-0.0055074	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

```
          Estimate
   K  =   4.2232E-003 ft/min
   y0 =   2.5246E+000 ft
```

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

613

VOLUME I

APPENDIX D

SURVEY DATA

SLOSS9.ASC JUNE 1997

```
3622,1302648.851360,715224.051341,569.020000,H+T3622
3623,1302470.102840,715276.873673,541.710000,24-SL0002
3624,1302498.730380,715209.036367,544.760000,24-SL0013
3625,1302683.712280,715102.949085,551.790000,24-SL0014
3626,1302722.854300,715313.444669,549.100000,24-SL0015
3627,1302637.987300,715421.302386,538.830000,24-SL0016
3628,1302861.280820,715152.769589,563.890000,H+T3628
3629,1302365.324350,715568.680632,538.330000,24-SL0003
3630,1302383.716100,715791.693897,554.220000,H+T3630
3631,1302352.009480,715746.142387,547.050000,24-SM0001
3632,1302252.222160,715804.540621,534.370000,24-SL0004
3633,1302227.441090,715938.579913,534.020000,24-SL0005
3634,1302371.436810,716046.097728,533.820000,24-SL0006
3635,1302357.912220,715917.984712,543.740000,24-SM0002
3636,1302534.273840,716078.238104,533.010000,24-SL0007
3637,1302529.933970,715996.997423,536.320000,24-SM0003
3638,1302832.587530,715743.699270,531.880000,24-SL0012
3639,1302899.801740,715789.572259,530.740000,24-SL0011
3640,1302988.965350,715983.816379,525.260000,24-SL0010
3641,1302864.404830,716059.816096,529.700000,24-SL0009
3642,1302739.097890,716084.202809,531.000000,24-SL0008
3643,1302798.449560,715889.586353,534.740000,24-SM0004
3644,1302936.611470,714899.432297,592.310000,H+T3644
3645,1303197.025590,715194.168410,599.710000,23-SM0002
3646,1303351.234470,715092.333971,613.940000,23-SM0001
3647,1303001.133450,715070.167367,599.790000,23-SM0004
3648,1303142.614670,714997.232731,597.610000,23-SM0003
3649,1303072.376380,714977.980445,597.640000,H+T3649
3650,1301771.198300,715799.902974,537.690000,H+T3650
3651,1300831.192590,715330.589973,540.730000,SET RR SPIKE3651
3652,1300382.474270,714892.189700,555.420000,39-SM0001
3653,1300828.014130,715047.397809,546.150000,H+T3653
3654,1300301.745890,714709.326824,573.580000,39-SM0002
3655,1301135.360210,715306.655892,543.360000,H+T3655
3656,1301311.535010,715451.620931,551.800000,39-SM0006
3657,1301771.766950,715695.984882,537.240000,39-SM0005
```

SLOSS10.ASC

JULY 1997

①

```
3658,1302961.127740,715049.331259,585.506449,23-36
3659,1302924.564430,715014.984244,579.460897,23-37
3660,1302903.811260,714971.943564,584.507744,23-38
3661,1302941.939280,714931.233964,590.954341,23-39
3662,1302955.681750,714922.016670,592.340453,23-1
3663,1303003.335530,714932.684359,594.216237,23-2
3664,1303050.913350,714946.843966.595.872888,23-3
3665,1303100.653960,714948.965786,598.561392,23-4
3666,1303120.470470,714907.429466,608.731801,23-5
3667,1303136.272530,714908.453347,610.597078,H+T3667
3668,1303151.434220,714864.936695,618.519530,23-6
3669,1303181.891900,714827.331225,624.060331,23-7
3670,1303209.668560,714779.032572,629.863452,23-8
3671,1303222.324930,714768.100524,632.279025,H+T3671
3672,1303258.752650,714790.432227,631.180381,23-9
3673,1303300.337030,714818.737492,631.993800,23-10
3674,1303339.043180,714851.580521,632.263512,23-11
3675,1303377.660000,714883.828767,632.626713,23-12
3676,1303415.315970,714915.354189,633.597004,23-13
3677,1303453.521920,714947.157341,634.082734,23-14
3678,1303486.773260,714983.852100,633.484980,23-15
3679,1303491.184780,714991.109970,633.537637,H+T3679
3680,1303507.165220,715028.859288,633.410450,23-16
3681,1303505.250600,715078.765509,631.316458,23-17
3682,1303501.190500,715094.435728,630.431847,H+T3682
3683,1303473.046640,715117.325734,628.342405,23-18
3684,1303426.986720,715136.579781,625.343525,23-19
3685,1303378.695100,715154.650393,621.920288,23-20
3686,1303348.486000,715160.196210,621.530797,H+T3686
3687,1303342.375310,715178.532926,620.712668,23-21
3688,1303340.347940,715226.594887,619.201003,23-22
3689,1303332.580930,715277.553714,617.797962,23-23
3690,1303298.030630,715283.198570,614.673464,H+T3690
3691,1303281.463850,715280.295526,613.434292,23-24
3692,1303233.481170,715273.981460,609.399439,23-25
3693,1303186.320760,715246.581769,606.322391,23-26
3694,1303143.917040,715222.349943,603.772187,23-27
3695,1303115.950480,715194.425920,600.833249,H+T3695
3696,1303099.214200,715199.844126,599.507576,23-28
3697,1303052.501970,715182.157542,590.300355,23-29
3698,1303016.404240,715173.057748,583.041472,H+T3698
3699,1303005.153970,715178.049568,580.762612,23-30
3700,1302961.579880,715207.117267,573.146834,23-31
3701,1302921.545040,715229.230538,566.164368,23-32
3702,1302924.575750,715180.448291,567.203637,23-33
3703,1302933.625310,715139.365167,568.852976,23-34
3704,1302960.792560,715095.550916,580.918355,23-35
3705,1302463.478320,715517.740668,539.154924,SET NAIL 3705
3706,1302324.371470,715490.374678,536.724828,TIE IN 3001
3707,1302324.376300,715490.333100,536.810000,NWH 3001
3708,1301964.642100,716403.103600,533.470000,NWH 3002
3709,1301771.198300,715799.903000,537.690000,3650
3710,1300831.192600,715330.590000,540.730000,3651
3711,1300828.014100,715047.397800,546.150000,3653
3712.1302304.595070,715558.970583,536.875976,38-8
3713,1302286.300600,715605.201230,536.747993,38-9
3714,1302267.518940,715651.496592,536.355047,38-10
3715,1302247.323620,715697.441588,535.465304,38-11
3716,1302225.181440,715741.046519,534.556450,38-12
3717,1302203.112920,715785.217419,533.297989,38-13
3718,1302181.563160,715827.638966,532.836770,38-14
```

July 1997

2

3719,1302167.597880,715874.707779,532.211288,38-15
3720,1302147.840790,715919.665449,531.659585,38-16
3721,1302127.829840,715964.481127,531.528303,38-17
3722,1302108.111510,716010.772484,531.276871,38-18
3723,1302088.221550,716058.659861,531.811335,38-19
3724,1302068.211740,716103.707503,531.799404,38-20
3725,1302047.923220,716147.898576,531.817743,38-21
3726,1302027.429420,716194.974423,531.649377,38-22
3727,1302007.321070,716238.129270,531.396320,38-23
3728,1301966.348610,716230.822048,534.599445,38-24
3729,1301941.662190,716185.549453,535.587910,38-25
3730,1301927.057340,716137.949863,534.982669,38-26
3731,1301911.948890,716088.305256,534.583944,38-27
3732,1301896.619490,716039.588418,533.361205,38-28
3733,1301881.161350,715992.200828,531.560315,38-29
3734,1301863.591130,715945.085254,532.880890,38-30
3735,1301843.804220,715900.410486,535.609814,38-31
3736,1301812.200900,715864.616427,536.187524,38-32
3737,1301773.551520,715833.755323,536.940762,38-33
3738,1301728.022280,715813.696455,536.450559,38-34
3739,1301688.803080,715788.714678,536.795234,38-35
3740,1301646.267740,715763.785867,538.542046,38-36
3741,1301607.675000,715737.167954,538.895127,38-37
3742,1301566.379710,715709.989913,539.312503,38-38
3743,1301522.618460,715679.585307,540.147194,38-39
3744,1301479.284880,715651.773556,539.878215,38-40
3745,1301438.551070,715621.486233,539.586556,38-41
3746,1301399.251420,715596.574191,539.630089,38-42
3747,1301354.432340,715569.589774,539.107283,38-43
3748,1301308.324420,715544.240865,538.516655,38-44
3749,1301264.293370,715522.777795,537.877277,38-45
3750,1301220.479910,715500.173570,538.038198,38-46
3751,1301174.511940,715475.725681,538.819931,38-47
3752,1301131.803780,715450.959551,538.865213,38-48
3753,1301090.649000,715426.985119,538.397863,38-49
3754,1301057.616980,715391.628698,538.625138,38-50
3755,1301020.450180,715357.560963,538.759782,38-51
3756,1300980.879180,715326.394386,539.032074,38-52
3757,1300936.527130,715301.661207,539.447668,38-53
3758,1300885.567460,715290.214231,540.437834,38-54
3759,1300844.819700,715255.909647,540.846022,38-55
3760,1300811.290590,715182.640485,543.438395,38-57
3761,1300804.344670,715140.266476,544.439855,38-58
3762,1300265.830390,714999.177540,569.258788,SET NAIL 3762
3763,1300761.091890,715117.371059,544.388113,38-59
3764,1300708.378590,715098.085303,545.653746,38-60
3765,1300663.278620,715076.973736,546.153420,38-61
3766,1300615.810130,715052.289275,547.268777,38-62
3767,1300570.446610,715021.759517,548.821914,38-63
3768,1300526.027550,714995.839524,550.369474,38-64
3769,1300485.643010,714967.656529,552.943858,38-65
3770,1300442.073370,714946.191275,554.728018,38-66
3771,1300397.380410,714923.943980,555.916196,38-67
3772,1300352.075830,714901.539449,554.340126,38-68
3773,1300308.853800,714879.528053,554.504156,38-69
3774,1300262.788910,714854.213340,553.526141,38-70
3775,1300217.514200,714831.970765,554.243217,38-71
3776,1300172.015220,714810.206476,554.173740,38-72
3777,1300124.493400,714789.211093,555.836012,38-73
3778,1300076.210090,714768.092517,557.514876,38-74
3779,1300028.943320,714746.304892,558.358077,38-75
3780,1299838.569530,714626.847853,561.798607,SET NAIL 3780
3781,1299998.401180,714705.770255,558.592558,38-76
3782,1299950.385280,714687.726021,559.749165,38-77
3783,1299906.732970,714663.954778,560.444112,38-78
3784,1299881.090310,714620.773537,562.875707,38-79

July
1997
3

3785,1299891.540720,714569.681993,566.394891,38-80
3786,1299899.363580,714523.591975,570.266928,38-81
3787,1299928.534520,714481.150550,570.646925,38-82
3788,1299938.314910,714455.246255,569.485338,H+T3788
3789,1299956.677040,714443.411788,567.585423,38-83
3790,1300096.120720,714302.170421,553.831110,38-87
3791,1300139.935150,714257.201076,556.206728,H+T3791
3792,1300138.232400,714282.477646,554.731084,38-88
3793,1300181.515980,714307.756420,556.014714,38-89
3794,1300221.771140,714338.521347,556.349384,38-90
3795,1300260.615690,714367.793042,556.492775,38-91
3796,1300299.155510,714397.201374,556.651500,38-92
3797,1300336.188370,714428.219478,555.825923,38-93
3798,1300375.354460,714457.605887,555.634014,38-94
3799,1300412.680170,714488.158113,555.424921,38-95
3800,1300449.352680,714523.123024,554.973898,38-96
3801,1300491.683780,714551.508616,554.728905,38-97
3802,1300531.620260,714579.523675,555.080996,38-98
3803,1300570.915750,714612.456578,554.722727,38-99
3804,1300611.939850,714642.261678,554.236675,38-100
3805,1300650.688550,714673.266894,553.755205,38-101
3806,1300689.375480,714704.812746,553.673184,38-102
3807,1300728.355170,714735.004109,553.466566,38-103
3808,1300767.537260,714765.247029,553.619769,38-104
3809,1300803.218810,714794.333655,553.688484,38-105
3810,1300844.298120,714826.865339,553.495019,38-106
3811,1300883.697820,714856.824213,553.445218,38-107
3812,1301191.342760,715096.954608,551.973577,SET NAIL 3812
3813,1300919.495890,714888.779697,553.256598,38-108
3814,1300960.385020,714917.284732,553.224633,38-109
3815,1300997.816460,714950.419157,553.027194,38-110
3816,1301037.543250,714979.329353,553.277054,38-111
3817,1301075.273610,715009.796850,552.764985,38-112
3818,1301114.164780,715039.506445,552.305522,38-113
3819,1301154.751630,715066.438856,552.425167,38-114
3820,1301193.178140,715093.747230,552.074953,38-115
3821,1301231.737240,715121.665031,551.703225,38-116
3822,1301274.617800,715147.554566,551.852261,38-117
3823,1301318.385930,715172.673361,551.859402,38-118
3824,1301363.500430,715195.278878,551.713000,38-119
3825,1301407.568260,715216.963916,551.718105,38-120
3826,1301452.998000,715235.791314,551.636268,38-121
3827,1301498.625540,715253.691960,551.668180,38-122
3828,1301516.568860,715261.620309,551.395663,SET NAIL 3828
3829,1301544.963960,715268.648556,551.694578,38-123
3830,1301593.604130,715282.633778,551.530323,38-124
3831,1301641.442800,715293.479950,551.254052,38-125
3832,1301690.171750,715303.692346,550.671121,38-126
3833,1301739.895410,715310.606092,550.581535,38-127
3834,1301789.363380,715317.134780,550.429926,38-128
3835,1301846.882600,715322.447885,549.912497,38-129
3836,1301878.086720,715327.045911,549.452785,38-130
3837,1301935.271290,715332.434386,548.858651,38-131
3838,1301946.850780,715336.953043,548.835136,SET NAIL 3838
3839,1301978.199570,715347.262698,548.078545,38-132
3840,1302026.525670,715357.190773,547.129343,38-1
3841,1302066.113670,715387.712317,543.972499,38-2
3842,1302108.817020,715413.089953,542.318691,38-3
3843,1302152.682830,715435.955584,540.844807,38-4
3844,1302196.388570,715463.128219,539.889848,38-5
3845,1302241.506030,715488.026119,538.861584,38-6
3846,1302289.940250,715515.127324,538.026272,38-7
3847,1302310.660790,715525.288199,537.866788,SET NAIL 3847
3848,1302324.463260,715490.120648,536.900328,TIE IN 3001

SLOSS11.ASC
AUGUST 1997

```
3849,1300766.381160,714757.540091,553.700000,NAIL 3849
3850,1300870.397710,714601.922257,556.770000,H+T3850
3851,1300591.221280,714392.974446,563.890000,MW 29
3852,1300591.669790,714392.626244,561.860000,DISC 29
3853,1301580.821180,715263.506390,552.150000,DISC P26
3854,1301581.075110,715262.952130,554.970000,MW 27
3855,1299944.777680,714462.332503,571.520000,MW 31
3856,1299944.277910,714461.963417,569.460000,DISC P-31
3857,1300254.027960,714830.368889,556.730000,MW 33
3858,1300253.855300,714830.766356,554.460000,DISC P-33
3859,1301330.697730,715425.057542,540.120000,DISC P-35
3860,1301330.337030,715425.631389,542.460000,MW 35
3861,1301651.729820,715618.754781,536.660000,H+T 3861
3862,1301777.430460,715667.992456,537.440000,MW 37
3863,1301777.156000,715668.579223,535.360000,DISC P-37
3864,1302463.477850,715517.709933,539.200000,NAIL 3864
3865,1302777.681100,715317.758883,550.570000,NAIL 3865
3866,1302856.553330,715290.194897,558.850000,MW 21
3867,1302856.106710,715289.830661,556.580000,DISC P-21
```

VOLUME I

APPENDIX E

THREATENED AND/OR ENDANGERED SPECIES CORRESPONDENCE

GERAGHTY
& MILLER, INC.
Environmental Services

a **heidemij** company

August 20, 1996

Ms. Jan Johnson, Science Information Manager
Natural Heritage Program
Alabama Department of Conservation
and Natural Resources
64 N. Union St., Room 421
Montgomery, AL 36130

Re: Threatened and Endangered Species Information

Dear Ms. Johnson:

The purpose of this letter is to request the most recent information concerning the occurrence of threatened and/or endangered plant and animal species, any habitats of special concern, and/or environmentally sensitive areas at or in the vicinity (within a three mile radius) of the site indicated on the enclosed figure. If such areas exist at or in the vicinity of the site, but are not in a position to be potentially impacted by the site, please indicate this in your response.

The site location can be found on the USGA Topographical Quadrangle Birmingham, North Alabama map (see attached site location map). Geraghty & Miller, Inc. is preparing an environmental study of the site and your information will be included in the report summarizing this study.

Thank you for your attention to this matter. If you have any questions, please do not hesitate to contact me at (919) 571-1662.

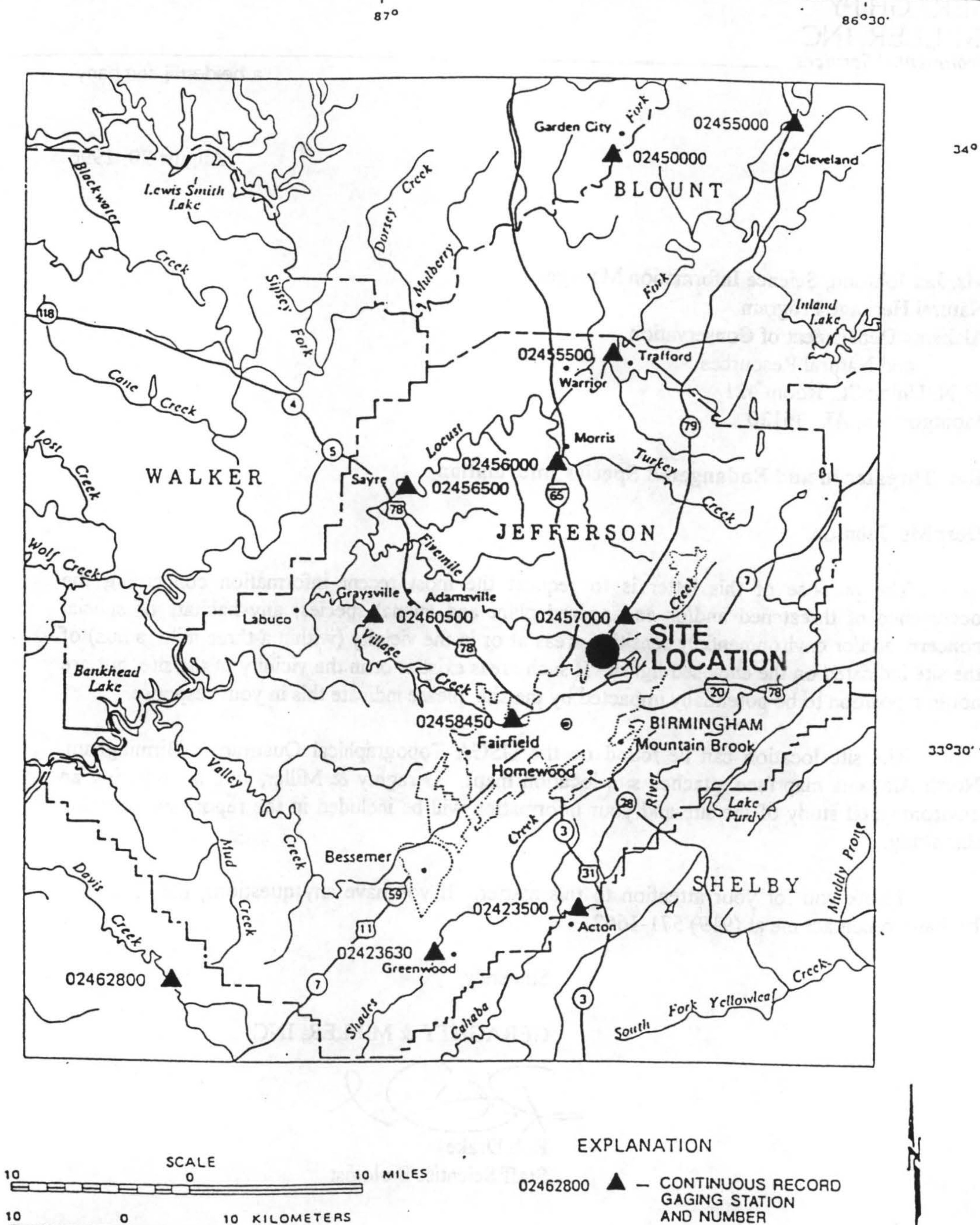
Sincerely,

GERAGHTY & MILLER, INC.

Rob Drake
Staff Scientist/Biologist

Enclosure

sl g:\temp\rdrake\alt&e.doc\20-Aug-96
CrossPointe II, 2840 Plaza Place, Suite 350 • Raleigh, North Carolina 27612 • (919) 571-1662 • FAX (919) 571-799



SOURCE: GEOLOGICAL SURVEY OF ALABAMA, ATLAS 16, 1980

GERAGHTY & MILLER, INC.
Environmental Services

REGIONAL SURFACE WATER HYDROLOGY

FACILITY - WIDE INVESTIGATION

FIGURE 3-2

GERAGHTY & MILLER, INC.
Environmental Services

a **heidemij** company

August 21, 1996

Mr. Robert McCollum
Division of Game and Fish
Alabama Department of Conservation
and Natural Resources
64 N. Union St., Room 584
Montgomery, AL 36130

Re: Threatened and Endangered Species Information

Dear Mr. McCollum:

The purpose of this letter is to request the most recent information concerning the occurrence of threatened and/or endangered plant and animal species, any habitats of special concern, and/or environmentally sensitive areas at or in the vicinity (within a three mile radius) of the site indicated on the enclosed figure. If such areas exist at or in the vicinity of the site, but are not in a position to be potentially impacted by the site, please indicate this in your response.

The site location can be found on the USGA Topographical Quadrangle Birmingham, North Alabama map (see attached site location map). Geraghty & Miller, Inc. is preparing an environmental study of the site and your information will be included in the report summarizing this study. A similar request has been sent to the Alabama Natural Heritage Program.

Thank you for your attention to this matter. If you have any questions, please do not hesitate to contact me at (919) 571-1662.

Sincerely,

GERAGHTY & MILLER, INC.

Rob Drake
Staff Scientist/Biologist

Enclosure

sl g:\temp\rdrake\al\t&e doc\21-Aug-96

CrossPointe II, 2840 Plaza Place, Suite 350 • Raleigh, North Carolina 27612 • (919) 571-1662 • FAX (919) 571-7994

STATE OF ALABAMA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
64 NORTH UNION STREET
POST OFFICE BOX 301456
MONTGOMERY, ALABAMA 36130-1456

JIM FOLSOM
GOVERNOR

CHARLEY GRIMSLEY
COMMISSIONER

DIVISION OF GAME AND FISH
CHARLES D. KELLEY
DIRECTOR

26 August 1996

Rob Drake
Staff Scientist/Biologist
GERAGHTY & MILLER, INC.
Cross Pointe II
2840 Plaza Place, Suite 350
Raleigh, North Carolina 27612

Dear Mr. Drake,

This letter is to inform you that there is an endangered animal species in the vicinity of the site indicated on the figure you sent me. The Federally listed Watercress Darter (*Etheostoma nuchale*) inhabits Roebuck Springs which is located east of the site location (see figure). I cannot determine from the figure you sent me whether the site location presents potential impact to the Watercress Darter or to Roebuck Springs, nor can I determine the proximity of Roebuck Springs to the site location.

Enclosed for your information are a list of Federally designated Threatened and Endangered species known to occur in Alabama and the list of State-protected animal species.

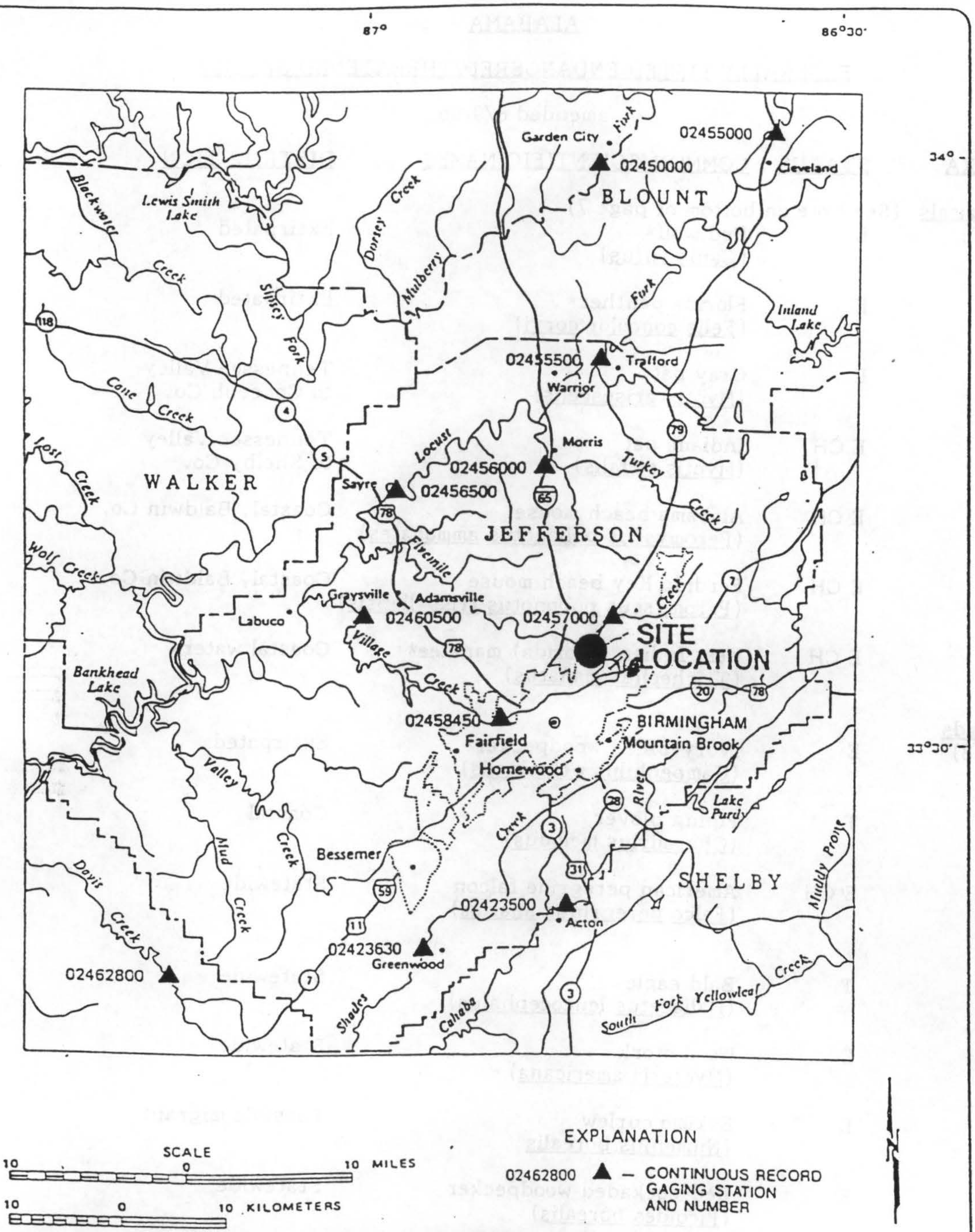
Sincerely,

Bob McCollum

Bob M^c^Collum
Nongame Biologist

Enclosures

RECEIVED
AUG 28 1996
G & M RALEIGH



SOURCE: GEOLOGICAL SURVEY OF ALABAMA, ATLAS 16, 1980

GERAGHTY & MILLER, INC.
Environmental Services

REGIONAL SURFACE WATER HYDROLOGY

FACILITY - WIDE INVESTIGATION

FIGURE 3-2

ALABAMA

FEDERALLY LISTED ENDANGERED/THREATENED SPECIES

amended 8/9/96

TAXA	STATUS	COMMON/SCIENTIFIC NAMES	DISTRIBUTION
Mammals (See Note on bottom of page 7)			
(7)	E	Red wolf* (*Canis rufus*)	Extirpated
	E	Florida panther* (*Felis concolor coryi*)	Extirpated
	E	Gray bat (*Myotis grisescens*)	Tennessee Valley to Conecuh Co.
	E CH	Indiana bat (*Myotis sodalis*)	Tennessee Valley to Shelby Co.
	E CH	Alabama beach mouse (*Peromyscus polionotus ammobates*)	Coastal, Baldwin Co.
	E CH	Perdido Key beach mouse (*Peromyscus polionotus trissyllepsis*)	Coastal, Baldwin Co.
	E CH	West Indian (Florida) manatee* (*Trichechus manatus*)	Coastal waters
Birds			
(8)	E	Ivory-billed woodpecker* (*Campephilus principalis*)	Extirpated
	T	Piping plover (*Charadrius melodus*)	Coastal
	E CH	American peregrine falcon (*Falco peregrinus anatum*)	Statewide
	T	Bald eagle (*Haliaeetus leucocephalus*)	Statewide
	E	Wood stork (*Mycteria americana*)	Statewide
	E	Eskimo curlew (*Numenius borealis*	Possible migrant
	E	Red-cockaded woodpecker (*Picoides borealis*)	Statewide
	E	Bachman's warbler* (*Vermivora bachmanii*)	Probably Extirpated

Reptiles (9)	T	Loggerhead sea turtle (Caretta caretta)	Coastal waters
	T	Green sea turtle (Chelonia mydas)	Coastal waters
	E CH	Leatherback sea turtle (Dermochelys coriacea)	Coastal waters
	T	Eastern indigo snake (Drymarchon corais couperi)	Extreme southern counties
	E CH	Hawksbill sea turtle (Eretmochelys imbricata)	Coastal waters
	T	Gopher tortoise (Gopherus polyphemus)	Choctaw, Mobile, Washington Cos.
	E	Kemp's (Atlantic) Ridley sea turtle (Lepidochelys kempii)	Coastal waters
	E	Alabama red-bellied turtle (Pseudemys alabamensis)	Mobile, Baldwin, Monroe Cos.
	T	Flattened musk turtle (Sternotherus depressus)	Upper Black Warrior River system
Amphibians (1)	T	Red Hills salamander (Phaeognathus hubrichti)	South Central
Fish (12)	T	Gulf sturgeon (Acipenser oxyrhynchus desotoi)	Coastal Delta
	T	Pygmy sculpin (Cottus pygmaeus)	Calhoun County
	T	Blue shiner (Cyprinella caerulea)	Cherokee County
	T CH	Spotfin chub (Cyprinella (=Hybopsis) monacha)	Lauderdale County Colbert County
	T CH	Slackwater darter (Etheostoma boschungi)	Madison, Lauderdale, Limestone Counties
	E	Watercress darter (Etheostoma nuchale)	Jefferson County
	E	Boulder darter (Etheostoma wapiti)	Tennessee River tributaries

	E	Cahaba shiner (Notropis cahabae)	Cahaba River
	E	Palezone shiner (Notropis spp., cf. procne)	Jackson County Paint Rock River
	T	Goldline darter (Percina aurolineata)	Cahaba River system
	T	Snail darter (Percina tanasi)	Madison County Jackson County
	E CH	Alabama cavefish (Speoplatyrhinus poulsoni)	Lauderdale County
Mollusks (37)	E	Anthony's riversnail (Anthearnia anthonyi)	Limestone Creek Limestone Co.
	E	Fanshell mussel (Cyprogenia stegaria)	Tennessee River
	E	Dromedary pearly mussel (Dromus dromas)	Tennessee River
	E	Yellow-blossom pearly mussel (Epioblasma(=Dysnomia) florentina florentina)	Tennessee River
	E	Upland combshell mussel (Epioblasma metastriata)	Black Warrior, Cahaba, and Coosa River drainages
	E	Purple cat's paw pearly mussel (Epioblasma obliquata)	Tennessee River
	E	Southern acornshell mussel (Epioblasma othcaloogenesis)	Upper Coosa and Cahaba River drainages
	E	Southern combshell mussel (Epioblasma penita)	Tombigbee River, Buttahatchie River
	E	Turgid-blossom pearly mussel (Epioblasma turgidula)	Tennessee River
	E	Fine-rayed pigtoe mussel (Fusconaia cuneolus)	Paint Rock River
	E	Shiny pigtoe mussel (Fusconaia cor (=edgariana))	Paint Rock River
	E	Cracking pearly mussel (Hemistena(=Lastena) lata)	Tennessee River
	T	Fine-lined pocketbook mussel (Lampsilis altilis)	Statewide

E	Pink mucket pearly mussel (*Lampsilis abrupta* (=*orbiculata*))	Tennessee River, Paint Rock River
T	Orange-nacre mucket (*Lampsilis perovalis*)	Tombigbee, Black-Warrior, Alabama, Cahaba drainages
E	Alabama lamp pearly mussel (*Lampsilis virescens*)	Paint Rock River, Hurricane Creek
T	Alabama moccasinshell mussel (*Medionidus acutissimus*)	Alabama, Tombigbee, Cahaba, Coosa, Black Warrior drainages
E	Coosa moccasinshell mussel (*Medionidus parvulus*)	Coosa, Cahaba, and Black Warrior drainages
E	Ring pink mussel (*Obovaria retusa*)	Tennessee River
E	Little-wing pearly mussel (*Pegias fabula*)	Tennessee River
E	White wartyback pearly mussel (*Plethobasus cicatricosus*)	Tennessee River
E	Orange-footed pearly mussel (*Plethobasus cooperianus*)	Tennessee River
E	Clubshell (*Pleurobema clava*)	Tennessee River drainage
E	Black clubshell mussel (*Pleurobema curtum*)	Tombigbee River
E	Southern clubshell mussel (*Pleurobema decisum*)	Statewide except Mobile Delta
E	Dark pigtoe mussel (*Pleurobema furvum*)	Black Warrior River drainage
E	Southern pigtoe mussel (*Pleurobema georgianum*)	Coosa River drainage
E	Flat pigtoe mussel (*Pleurobema marshalli*)	Tombigbee River
E	Ovate clubshell mussel (*Pleurobema perovatum*)	Statewide
E	Rough pigtoe mussel (*Pleurobema plenum*)	Tennessee River
E	Heavy pigtoe mussel (*Pleurobema taitianum*)	Tennessee River

	T	Inflated heelsplitter mussel (Potamilus inflatus)	Black Warrior River to Mobile Bay
	E	Triangular kidneyshell mussel (Ptychobranchus greeni)	Black Warrior, Cahaba, and Coosa River drainages
	E	Cumberland monkeyface pearly mussel (Quadrula intermedia)	Tennessee River
	E	Stirrup shell mussel (Quadrula stapes)	Tombigbee River, Sipsey River
	E	Pale lilliput pearly mussel (Toxolasma (=Caruncuina) cylindrellus)	Paint Rock River, Hurricane Creek
	E	Tulotoma snail (Tulotoma magnifica)	Coosa River System, Choccolocco Creek
Arthropods			
Crustacea (1)	E	Alabama cave shrimp (Palaemonias alabamae)	Madison County
Insecta (1)	E	American burying beetle (Nicrophorus americanus)	Statewide
Plants (18)	T	Little amphianthus (Amphianthus pusillus)	Chambers, Randolph Counties
	T	Price's potato-bean (Apios priceana)	Marshall, Autauga Cos.
	E	Rock cress (Arabis perstellata)	Bibb County
	E	Morefield's leather flower (Clematis morefieldii)	Madison Co.
	E	Alabama leather flower (Clematis socialis)	St. Clair, Cherokee Counties
	E	Leafy prairie-clover (Dalea foliosa)	Franklin, Morgan, Lawrence, Jefferson Cos.
	E	Gentian pinkroot Spigelia gentianoides	Bibb County
	T	Lyrate bladder-pod (Lesquerella lyrata)	Colbert, Franklin Cos.

E	Pondberry (Lindera melissifolia)	Wilcox County
T	Mohr's Barbara's buttons (Marshallia mohrii)	Bibb, Cullman, Cherokee, Walker, Etowah Cos.
T	American hart's-tongue fern (Asplenium scolopendrium var. americanum) (=Phyllitis japonica ssp. americanum)	Morgan, Jackson Cos.
E	Harperella (Ptilimnium nodosum	Cherokee, DeKalb Cos.
T	Kral's water-plantain (Sagittaria secundifolia)	Cherokee, DeKalb Cos.
E	Green pitcher plant (Sarracenia oreophila)	Marshall, Jackson, Etowah, DeKalb, Cherokee, Elmore, Russell Cos.
E	Alabama canebrake pitcher-plant (Sarracenia rubra alabamensis) (=S. alabamensis ssp. alabamensis)	Autuga, Chilton, Elmore Cos.
E	American chaffseed (Schwalbea americana)	
T	Alabama streak-sorus fern (Thelypteris pilosa var. alabamensis)	Winston County
E	Relict trillium (Trillium reliquum)	Henry, Lee, Bullock Cos.
E	Tennessee yellow-eyed grass (Xyris tennesseensis)	Franklin Co.

Total Animal Species: 76 (not including 5 species of whales)
Total Plant Species: 18

* = Not believed to occur in Alabama

Status:
E = endangered
T = threatened
CH = critical habitat has been designated

The American alligator is neither threatened nor endangered, but designated so because of similarity of appearance to the threatened American crocodile.

NOTE: There are 5 endangered species of whales found in coastal waters of the southeastern states. These include the finback whale (Balaenoptera physalus), the humpback whale (Megaptera novaeangliae), the right whale (Balaena glacialis), the sei whale (Balaenoptera borealis), and the sperm whale (Physeter catodon). It is possible, though unlikely, that they could appear in Alabama coastal waters.

ALABAMA

220-2-.92 Non-game Species Regulation

(1) It shall be unlawful to take, capture, kill, or attempt to take, capture or kill, possess, sell, trade for anything of monetary value, or offer to sell or trade for anything of monetary value, the following non-game wildlife species (or any parts or reproductive products of such species) without a scientific collection permit or written permit from the Commissioner, Department of Conservation and Natural Resources, which shall specifically state what the permittee may do with regard to said species:

(a) FISHES

Common Name	*Scientific Name*
• Cavefish, Alabama	Speoplatyrhinus poulsoni
• Cavefish, Southern	Typhlichthys subterraneus
• Chub, Spotfin	Cyprinella monacha
• Darter, Boulder	Etheostoma wapiti
• Darter, Coldwater	Etheostoma ditrema
• Darter, Crystal	Crystallaria asprella
• Darter, Goldline	Percina aurolineata
• Darter, Slackwater	Etheostoma boschungi
• Darter, Snail	Percina tanasi
• Darter, Tuscumbia	Etheostoma tuscumbia
• Darter, Watercress	Etheostoma nuchale
• Madtom, Frecklebelly	Noturus munitus
• Sculpin, Pygmy	Cottus pygmaeus
• Shiner, Blue	Cyprinella caerulea
• Shiner, Cahaba	Notropis cahabae
• Shiner, Palezone	Notropis albinotus

(b) AMPHIBIANS

Common Name	*Scientific Name*
• Frog, Dusky Gopher	Rana capito sevosa
• Hellbender, Eastern	Cryptobranchus alleganiensis alleganiensis
• Salamander, Flatwoods	Ambystoma cingulatum
• Salamander, Green	Aneides aeneus
• Salamander, Red Hills	Phaeognathus hubrichti
• Salamander, Seal	Desmognathus monticola (of Coastal Plain origin)
• Salamander, Tennessee Cave	Gyrinophilus palleucus
• Treefrog, Pine Barrens	Hyla andersonii

(c) REPTILES

Common Name	*Scientific Name*
• Coachwhip, Eastern	Masticophis flagellum flagellum
• Snake, Black Pine	Pituophis melanoleucus lodingi
• Snake, Eastern Indigo	Drymarchon corais couperi
• Snake, Florida Pine	Pituophis melanoleucus mugitus
• Snake, Gulf Salt Marsh	Nerodia fasciata clarki
• Snake, Southern Hognose	Heterodon simus
• Terrapin, Mississippi Diamondback	Malaclemys terrapin pileata
• Tortoise, Gopher	Gopherus polyphemus
• Turtle, Alabama Map	Graptemys pulchra
• Turtle, Alabama Red-bellied	Pseudemys alabamensis
• Turtle, Alligator Snapping	Macroclemys temmincki
• Turtle, Barbour's Map	Graptemys barbouri

(d) BIRDS

Common Name	*Scientific Name*
• Crane, Mississippi Sandhill	Grus canadensis pulla
• Dove, Common Ground	Columbina passerina
• Eagle, Bald	Haliaeetus leucocephalus
• Eagle, Golden	Aguila chrysaetos
• Egret, Reddish	Egretta rufescens
• Falcon, Peregrine	Falco peregrinus
• Hawk, Cooper's	Accipiter cooperi
• Merlin	Falco columbarius
• Osprey	Pandion haliaetus
• Oystercatcher, American	Haematopus palliatus
• Pelican, American White	Pelecanus erythrorhynchos
• Plover, Piping	Charadrius melodus
• Plover, Snowy	Charadrius alexandrinus
• Plover, Wilson's	Charadrius wilsonia
• Stork, Wood	Mycteria americana
• Tern, Gull-billed	Sterna nilotica
• Warbler, Bachman's	Vermivora bachmani
• Woodpecker, Red-cockaded	Picoides borealis
• Wren, Bewick's	Thryomanes bewickii

(e) MAMMALS

• *Common Name*	*Scientific Name*
• Bat, Gray Myotis	Myotis grisescens
• Bat, Indiana	Myotis sodalis
• Bat, Rafinesque's Big-eared	Plecotus rafinesquii
• Bat, Southeastern	Myotis austroriparius
• Gopher, Southeastern Pocket	Geomys pinetis
• Mouse, Alabama Beach	Peromyscus polionotus ammobates
• Mouse, Meadow Jumping	Zapus hudsonius
• Mouse, Perdido Key Beach	Peromyscus polionotus trissylepsis
• Weasel, Long-tailed	Mustela frenata

(f) Other State or Federally protected non-game species.

In addition any required federal permits for federally protected species must be obtained.

(2) It shall be unlawful to collect or offer for sale, sell, or trade for anything of value any box turtle (Terrapene carolina), box turtle part or reproductive product except by permit as outlined in paragraph (1).

(3) It shall be unlawful to collect, harvest, possess, offer for sale, sell or trade for anything of monetary value any common snapping turtle (Chelydra serpentina serpentina) or soft shell turtles (Apalone ferox, Apalone muticus muticus, Apalone muticus calvatus, Apalone spiniferus spiniferus, Apalone spiniferus asper) with a carapace length less than eight inches. (Except any species protected under this paragraph taken in a live trap by a pond owner or his agent while controlling nuisance animals is exempt but may not be sold or offered for sale or traded for anything of monetary value.)

(4) Informational Note: See Section 9-11-269, Code of Alabama 1975, relating to protection of the flattened musk turtle (Sternotherus minor depressus).

I, JAMES GRASSIANO, am responsible for filing documents in the

(Name of file) SLOSS IND, B'HAM file. The attached document,

(Name of document) RFI LAND DISPOSAL AREAS, VOL I of III

was originally submitted to the Alabama Department of Environmental Management in a 3-ring binder.

For ease of filing, only the binder has changed. No material has changed in the document. No other alterations have been made to said document, and it is otherwise in its original form as submitted to the Alabama Department of Environmental Management.

Done this 10TH of Feb, 1999.

Witness: